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Pit-head Generation

THE generation of electricity in the coalfields for transmission to urban centres has in the past exercised the imagination of the people of this country to an extent second only to the appeal of water power, but, on the whole, its advocates have been better informed.

Professor F. G. Baily's address, yesterday, as president of the Engineering Section of the British Association, was one of the most serious contributions that has been made to the discussion of pithead generation since the late B. H. Thwaite investigated its possibilities and published his results (with a dissertation on transmission problems as then known) in the ELECTRICAL REVIEW in 1901.

The justification for reopening the question now is the very different forces that have come into play since Thwaite envisaged 500-h.p. gas engines, 20-kV transmission, and a load in London of 10,000 h.p.

The new twist given the subject by Professor Baily is, in effect, due to the existence of the national grid, the practicability of using dirty coal forming the residue of modern dry-cleaning plant, and the high efficiencies achieved by stations relying on modern concrete cooling towers for their condensing water. In the first point he follows the original Weir Report, which gave as one of the advantages of the grid that it would bring into service potential sources of power hitherto untapped.

Professor Baily estimates the amount of waste coal available at 10 per cent. of the tonnage raised, which works out at about twenty million tons per annum. This would be enough to serve the needs of both public and private plants, but it would not provide for the electrification of plant at present mechanically driven. He takes the calorific value of the waste coal at 10,000 B.th.u. per lb., which seems to us on the high side, judging by some of the stuff we saw in power-station bunkers during the coal dispute in 1926, and we should expect its use to increase maintenance costs appreciably in the boiler-house.

Overall costs for pithead stations of 0.05d. per kWh below those of ordinary steam stations at all load factors probably could be obtained in certain cases, even with the lower vacuum with cooling towers. Hams Hall and Brimsdown show this, but it would be bold to assume that the requisite conditions would prevail at any considerable number of collieries.

Much depends upon the price of this waste coal, which is taken at 5s. per ton. Would not the price rise sharply, as it did for inferior steam coal when mechanical stokers were first introduced? Professor Baily has this in mind, and there is nothing Utopian in his proposals; he does not suggest that existing stations should be scrapped, but only that extensions should gradually be made at the coalfields.

He believes that ownership and control of the pithead stations should be centralised, so that a definite policy should be pursued. In any case, we think that the authority with whose system a colliery station was connected should decide the manner and hours of its operation.

A Misleading Description

Is it realised that for many years we have been inadvertently giving our rivals a gratuitous advertisement? Advertising consists largely of drumming a particular name or statement well into the subconscious mind of the public until they believe that what is said so many times cannot but be good and true. "Gas" is one of these words; the public have been made gas-conscious by thousands of advertisements in the Press and on the hoardings—they are thoroughly gasfilled. And so are the electric lamps which have been in use now for two decades. They were originally called "half-watt" lamps, but that desire for strict accuracy which characterises the electrical industry led to the gradual dropping of the term in favour of "gasfilled." In spite of this, however, we do not believe that the public ever thought that they were anything but electric. But now we have a new type of lamp in which a gas plays a greater part, and it has been called a gas-discharge lamp. The

colour of its light is not the same as that of the electric light familiar to the man in the street, and he can perhaps be excused if, in conjunction with the makers' own description, he imagines that it is merely a development of gas lighting. That will never do, and we hereby call upon our readers to eschew the horrible term and from henceforth describe these new luminaries as *electric*-discharge lamps.

No Throttling Down

SIR JAMES JEANS made it quite clear in his address as President of the British Association this week that he is on the side of those who deprecate the tendency to blame science for the present world muddle. An invention, as he pointed out, may merely save labour or it may start a new industry that will find employment for multitudes; thus the economic value of Edison's work has been estimated at three thousand million pounds. If science were throttled down, both kinds of invention would be discouraged, and society would become crystallised in its present unbalanced state.

Heating in Small Industries

THE advantages of electric heating in simplicity, cleanliness, freedom from fumes, and easy and accurate regulation may be of decisive importance in enabling craftsmen in "one-man" businesses to compete with larger concerns. Any desired degree and quantity of heat can be provided for annealing, hardening, burning, drying or other processes, and over and above its other advantages an electric stove or furnace can be installed where the available space, the nature of the surroundings and the need for a flue would preclude the use of other heating agencies. In recognition of these facts, and in furtherance of the new national policy of reviving craftsmanship and small industrial establishments as a means of increasing employment, German electrical manufacturers and supply authorities are paying special attention to the marketing of equipment and the provision of supply tariffs meeting the needs of small users. Electrically heated appliances for such operations as vulcanising, baking moulding compounds, heat-treating special steels, and so on enable the small "owner-workman" to use methods and obtain results which would otherwise be restricted to larger establishments.

The Heat Pump

IN an article in an American contemporary it is implied that the home of to-morrow may be heated by reversed refrigeration. This seems to us to be too optimistic a statement of the case for the method by which electrical energy is converted first into mechanical energy and then used on the Carnot principle to pump heat from a low to a higher temperature. The economy becomes greater as the temperature range is decreased, and the most suitable application would be for the heating of swimming baths (for which a temperature of over 80 deg. F. is not required), as Mr. T. G. N. Haldane showed in his I.E.E. paper on the subject five years ago. For buildings where a large emission surface is practicable, panel heating at, say, 120 deg. F. might be feasible on this system, but under normal conditions a higher temperature would be necessary and the overall economy of the heat pump would disappear.

A Difficult Matter

THE question of an annual electrical show at Olympia or some other suitable place is once again raised by a correspondent in this issue. There can be no question as to the desirability of such a display, but many things have to be taken into consideration. A really representative electrical exhibition would be a vastly different matter from the Radio Show. If it were confined merely to the smaller classes of electrical apparatus the effect would be monotonous; while if the heavier plant were included the cost of transportation could not be justified for a short-period exhibition. True, several electrical manufacturers put some of their large work into the British Industries Fair, but the very different nature of this show probably makes it a paying move. It is questionable whether a 50,000-kVA transformer placed on view at a popular electrical exhibition would bring customers; at the B.I.F. there is a prospect of remunerative business. Before manufacturers go into a show they naturally want to be assured that there will be some return in the not-too-distant future. In these days they find bread too expensive to cast indiscriminately upon the waters of public amusement. There are simpler and cheaper means of interesting the public in electrical matters. Let us, then, while not ruling out the possibility of a big electrical show in the near future, employ these means to the utmost.

A Widespread Effort

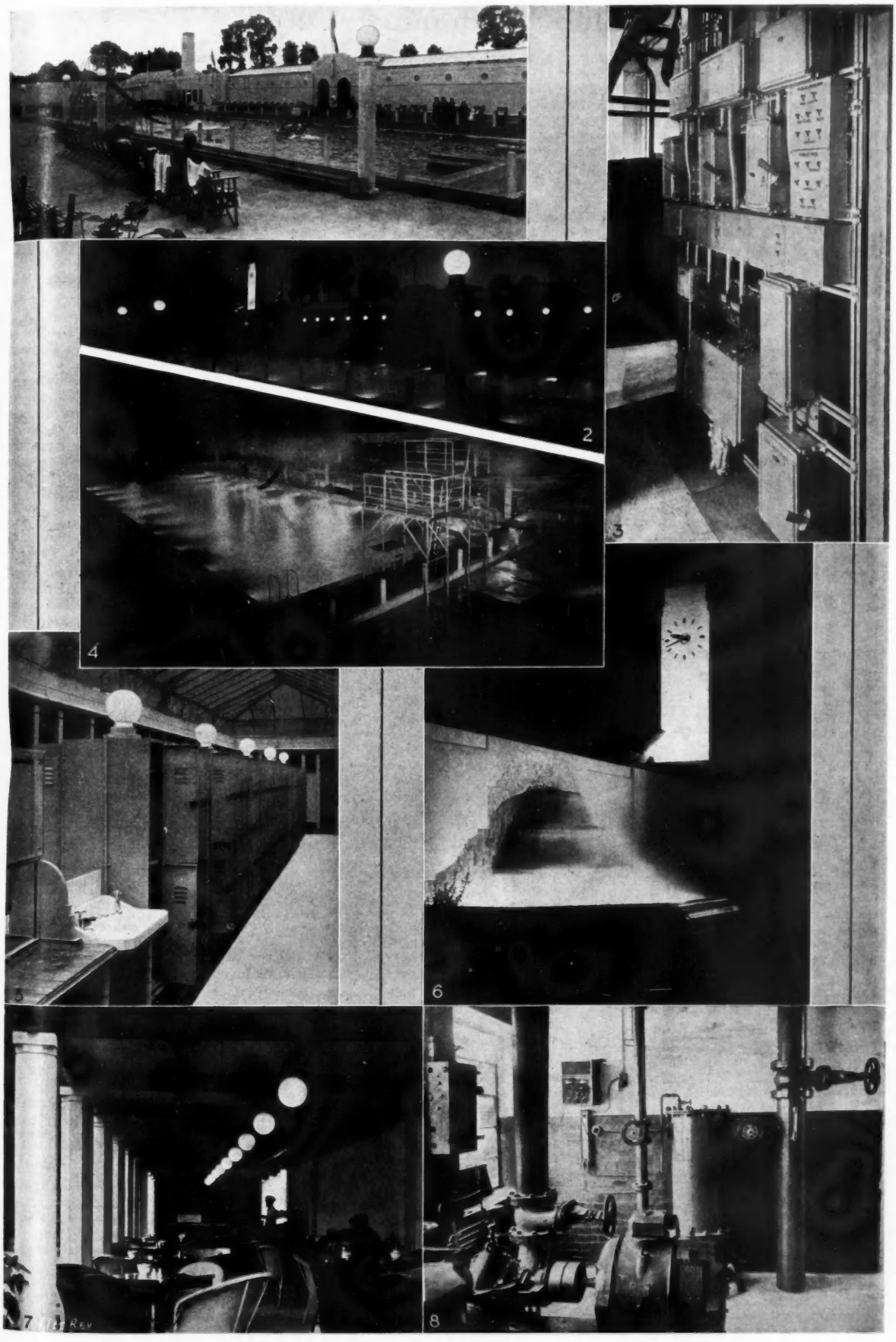
THE campaign to improve its domestic load which Edmundson's Electricity Corporation is now waging should prove of great benefit to the whole industry for the Corporation operates over a wide area—or a number of wide areas. Its interests extend to places so far apart as South Wales and East Anglia, and Shropshire and the Isle of Wight. Much of its work lies in rural areas, which are probably the hardest to cultivate, but some remarkable results have already been obtained. For some districts the Corporation can produce figures which would put many urban undertakings to shame.

Help from the Air

WE believe that the reference to the use of an aeroplane in the letter from Mr. W. J. Williams, Director of the Electricity Department, F.M.S., relates to the first occasion on which this means has been employed to assist linesmen. An insulator on an e.h.v. line fed from Bungsar power station flashed over, causing the switch to trip. Though the switch on reclosure stayed in, it was imperative that the insulator should be renewed immediately. The mains engineer sent out a repair gang and, judging its journey time, rang up the power station to make the line dead. He then flew over the spot where the men were assembled and dropped a green cloth to indicate that the work could be started. As soon as the repair was completed the men signalled the aeroplane, when the mains engineer flew back to the nearest telephone and instructed the power station staff to make the feeder alive. This method has the defect of depending upon visual and telephoned communications, but in the circumstances it was safe enough, and reduced the period of interruption in the supplies to the mines to twenty minutes from the two hours or more that would otherwise have been necessary.

Hydro-Electric Storage

The filling up of the load curves of hydro-electric stations by pumping water to reservoirs for driving turbines at peak loads is fairly common practice abroad, as Mr. F. Johnstone Taylor shows in his article this week. The only considerable scheme of the kind officially proposed for Great Britain was in connection with the Severn Barrage, in view of the great difference in tidal heads, but presumably little will be heard again of this ambitious but speculative scheme. Mr. J. W. Meares suggested, in our columns, as a cheaper alternative, that peak-load stations might be employed for pumping in conjunction with water turbines, but the most recent stations, those in Galloway, will run without storage, sending their output to the grid. This is a practicable method only if water power forms a small proportion of the total from all sources.



The Roehampton Club's Open-air Swimming Pools. **(See page 302)**

(1) Daylight view of the larger public bathing pool. (2) Night view of pool, showing projectors inset flush in dressing-room walls. (3) "Simplex" distribution switch and fuse gear. (4) Under-water illumination of pool by night. (5) Interior lighting of dressing room, showing clothes lockers. (6) Colour-lighted cascade fountain and chimney clock tower. (7) Exterior refreshment loggia illumination. (8) Electro-katadyn water sterilising plant, with motor-driven pump in foreground

Club Swimming Pools

Sterilisation by the new electro-katadyn silver process

THE natural amenities of the Roehampton Club have recently been added to by the construction of two open-air swimming pools, the architectural design of which incorporates a colour scheme which blends nicely with the park-like atmosphere of this sports centre.

The baths have been built at right angles to each other in a corner of the Club's grounds, surrounded by trees. The smaller, which is 25 ft. wide and 70 ft. long, varying in depth from 3 to 6 ft., is secluded and reserved for the use of Club members, who also have convenient access to the larger adjacent pool, which is 40 ft. wide and 120 ft. long with a depth varying from 2 ft. 9 in. to 7 ft. and to which members of the public are admitted.

A turfed slope affords sun-bathing facilities, and light refreshments are served on a covered loggia along the wall dividing the two pools. The kitchen equipment includes a Kelvinator refrigerator and a Lyons ice-cream cabinet with separate mains plugs.

In the ladies' dressing room is a Calvete motor-driven hot-air hair dryer, which is controlled by a Venner penny-in-the-slot meter-switch.

Artificial Illumination

Nearly all the interior lighting is by means of spherical opal globes, similar fittings being also mounted out of doors on reconstructed stone standards made by the Patent Victoria Stone Co., Ltd. In the private pool enclosure are a few wall-bracket and standard flare fittings by Allom Bros., Ltd., which provide indirect illumination. A spotlight on the roof illuminates the chimney clock tower and another can be trained on to either swimming pool.

Extending the whole length of each of the two brick-built dressing-room blocks is a row of projectors inset behind flush prismatic glasses for floodlighting the pools. The underwater lighting of the larger swimming bath is effected by twenty Holophane projectors, each housing a 500-W lamp, in specially formed pits about six inches below water level. The underwater portholes are sealed with double bronze flange frames glazed with armour-plate glass.

For filtration the water is pumped from the deep end of the larger pool and returned to the shallow end by way of an ornamental cascade fountain, which is illuminated by means of Holophane fittings containing lamps behind coloured screens recessed round the inside rim of the basin.

The distribution wiring installation was carried out by Messrs. G. W. Franklin & Son, the several circuits being controlled by "Simplex" metalclad switch- and fuse-gear.

Both large and small pools share the same water purification apparatus. Provision is made for heating by means of a coke boiler installation, and the filtration plant was installed by the Paterson Engineering Co., Ltd.

The whole of the water undergoes purification treatment four times in twenty-four hours continuously. After passing through the usual broken stone-sand filters, which remove all solid matter held in suspension, the water is treated with alum and soda, to neutralise acidity or normalise alkalinity, as the case may be, before it is sterilised and aerated on its way back into the pools.

The Sterilisation System

A new system of sterilisation has been adopted for this and one or two other recent installations. It is known as the electro-katadyn process and has made it possible to dispense with the more conventional chlorine treatment. The water is consequently free from the taste and odour sometimes associated with that method, while the difficulty of keeping down growths without a somewhat excessive use of chlorine is appreciably reduced.

This new electrical process is of special interest, for it seems to depend upon the sterilising action of the exceedingly small proportion of silver which can be introduced into the water in the form, it may be assumed, of free metallic ions. While there does not appear to be any reason to doubt the germicidal efficacy of the process, water so treated is not believed to be rendered entirely sterile, and the precise mode of action bacteriologically does not appear to be clearly understood as yet.

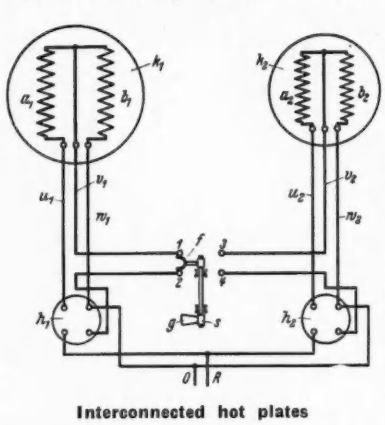
The whole of the water does not need to be so treated, but merely a proportion depending upon its quality, which is by-passed for the purpose from, and is then returned after sterilisation to mix with, the clear filtered outlet stream. Treatment consists in running the by-passed water between two silver plates, which act respectively as cathode and anode, the water being the electrolyte through which a small direct current is made to flow. The current is obtained in this particular installation through a metal rectifier operating in conjunction with a small controller which will pass up to 3 A at up to 2.5 V according to the conductivity of the water.

At intervals determined by a clock-like reversing switch the direction of current flow is changed so that the silver plates alter their polarity and waste equally.

Accessories to the filtration plant include a water circulating pump and an air compressor for blowing through the filters when they are being cleaned out. These are both driven by Harland electric motors and controlled by starters of the Electrical Apparatus Co.'s make.

Restricted-demand Hot Plates

THE accompanying illustration from *Elektrotechnische Zeitschrift* shows a circuit arrangement devised for the purpose of restricting the maximum demand of two hot plates, thus avoiding the necessity for special wiring in many instances where the inadequacy of existing wiring has hitherto prevented the adoption of electric cooking. The arrangement is based on the premise that cooking can be done quite satisfactorily without using full heat on both plates simultaneously; for example, a meat stew would be boiled and reduced to the low-heat or simmering connection before it was necessary to run the second plate at full heat for boiling potatoes.



Interconnected hot plates

The diagram shows two hot plates k, each with two heating elements a, b and provision for series and parallel switching at h, the supply connection being at O, R. The distinctive feature is the addition of a change-over switch s with handle g and contact-bridge f, which completes either the connection v_1 or v_2, but never both together. With s in the position shown, the elements in k_1 can be used either in series or in parallel under the control of h_1 but the elements in k_2 can only be used in series. When s is reversed, k_2 can be used at full heat, but k_1 only at low heat. Experience shows that the user soon becomes accustomed to the additional switching required.

A recommended combination comprises 5¾-in. and 7-in. hot plates each rated at 1,200 W. By arranging that the larger plate is restricted to 250 W and the smaller to 220 W, when the other is available at full heat, the maximum demand is limited to 1,200+250=1,450 W, which can be carried by a 7-A fuse in a 220-V circuit. The arrangement illustrated is covered by German Patent No. 514,355, and is being manufactured by the Carl Gottbill sel. Erben, G.m.b.H., Mariahütte (Trier).

As an extension of the same principle, a small cooker is under development with 800-W and 1,200-W hot plates on one side of the limiter switch and a 1,000-W oven on the other side. The maximum demand of this equipment is 800+1,200+(½×1,000)=2,250 W, constituting a load which can be carried by 1.5 sq. mm. (say 3/0.036 in.) wires and a 10-A fuse on a 230-V supply.

Smoke Abatement

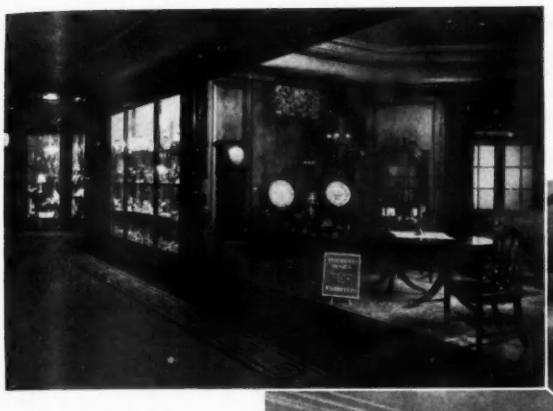
The programme of the sixth annual conference of the National Smoke Abatement Society to be held at Glasgow from September 27th to 29th includes a paper by Dr. J. S. Owens of the Department of Scientific and Industrial Research on "The Measurement of Atmospheric Pollution." Dr. Owens will demonstrate a new instrument for measuring smoke emission. The effects of smoke on horticulture (Mr. W. D. Besant) and on visibility and aviation (Messrs. W. J. Grassie and O. Cochran) will be among the other subjects discussed.

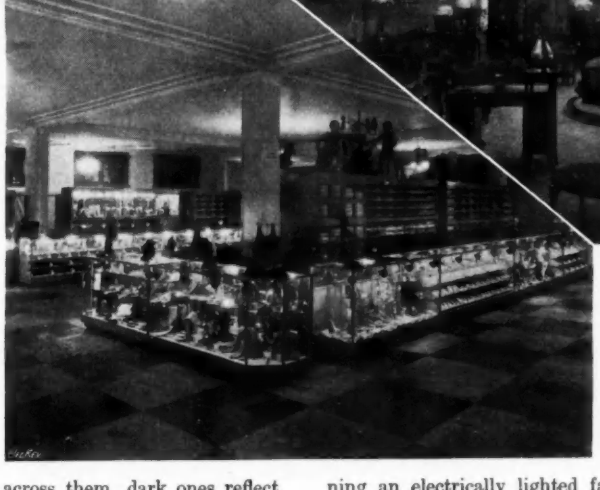
Correct Lighting in Stores. By Penelope Warrender

Appealing to the passer-by

SHOPKEEPERS are fully aware in these days that electric light, when correctly used, is one of the most successful and reliable forms of advertising. Effective window illumination should be treated as a necessity. Much serious thought is given to the arrangement of the windows by the display man in order to avail himself of the utmost help which daylight can render him, but as often as not little time is spent in visualising just how the same setting will appear when illuminated in a haphazard manner. A well-designed illumination scheme, free from glare, produces a "stage effect" at a time when the public has sufficient leisure in which to notice it.

The primary function of a display window is to sell goods by cunningly placing them before the public and, in some subtle way, connecting them with the name of the store. In some establishments the window space represents 40 to 50 per cent.





Left: to give this effect "X-Ray" reflectors are concealed in the shop window. Right: An example of suspended decorative troughing. Bottom: Enhanced showcase lighting with "Scoopette" reflectors

of the total ground floor area, and it is, therefore, reasonable to suggest that the value of illuminating this is considerable.

The four essentials to good lighting are adequate intensity, sufficient diffusion to overcome all shadows, correct placing of lighting units, and absence of flicker and glare.

While white articles reflect approximately 80 per cent. of the light which falls across them, dark ones reflect, at the most, only 1 per cent. to 2 per cent. More light is also required for fine articles than large ones. Glare, either direct or reflected, and flickering are injurious to the eyes, while diffusion reduces it and softens shadows. Lighting from concealed sources has been rendered necessary by the intense brightness of present-day gasfilled lamps, for dazzle makes it practically impossible to view a display with ease.

Upon the brightness of the surroundings will depend to a great extent, the amount of light necessary in the windows. High buildings or competitive illumination will naturally compel a shopkeeper to install more light in order to make his establishment stand out prominently. For economic reasons the reflectors should be arranged on two or more circuits so that, if the weather is dull, a limited amount of artificial illumination may be given to the display. Even on bright days a certain number of lamps may be used to minimise daylight reflections, which are the bugbear of every store owner.

Under average conditions the following table will be useful:

Wattage per foot length of window.	Situation of shop window.	
200	Principal street	City
150	Secondary "	"
150	Principal "	Large town
100	Secondary "	" "
100	Principal "	Small "
60	Secondary "	" "

A special shop window reflector should be fixed in a permanent position so that the whole of the light given by the lamp is directed on the display. Two kinds of reflectors are manufactured, intensive and extensive. The former have horizontal mouths and are intended for windows which are less than half as deep as they are high. The latter type have the mouth at an angle to the horizontal, and are designed for use in deep windows. Both types are available, either as a single unit for one lamp, or in a trough formation, with holders for two, four, or six lamps.

There are several ways of installing the window equipment, and a customary method is to place it directly on the ceiling near the plate glass front. Concealment of the lighting units is ensured by fixing a pelmet between them and the glass, while a method which is favoured by many contractors consists of cutting away part of the window ceiling so that only the mouths of the reflectors come over the apertures. When high intensities are required it is advisable to use two rows of units of normal size.

Re-entrant windows and island sites give the shopkeeper increased space for display, but the lamps need to be screened from view from all angles. A second pelmet draped between the reflectors and the centre of the window ceiling will effectively conceal the mode of lighting, but a better plan appears to be the provision of a false ceiling of obscured glass. Coloured lighting makes an appeal to every passer-by which it is hard to resist, and is achieved by using colour frames and screens in conjunction with spot lights and floodlighting units.

The exterior of the shop immediately above the windows, known as the facia, is an important advertising position. The cost of running an electrically lighted facia ensuring that the owner's name is visible after dark is trifling, the load rarely exceeding 1 kW. A time switch controls the "after-hour" lighting, and the current is switched off at a pre-determined time.

Every shop should aim at creating an appealing atmosphere, for by this means sales are induced. The general lighting of the interior should be such that it is possible for all customers to observe clearly and quickly not only the goods on the counter but also those displayed on shelves. Totally indirect lighting, which offers freedom from shadows, is effective if used in conjunction with luminous ornaments or portable lamps to produce a contrast. Diffusing units of the totally enclosed type are available in a variety of tints, and give excellent illumination.

Showcases should always be considered as lesser display windows and illuminated accordingly. Fittings must naturally be small yet efficient. Polished aluminium strip reflectors with tubular lamps, concealed by a small pelmet, or miniature window reflectors which can easily be attached to the case by means of wire stands or brackets, are sufficient to call attention to the wares. Small cases need 15-W lamps installed every 18 to 20 inches, while more massive ones can carry 25-W lamps in the same space.

Architectural Lighting

Architectural lighting becomes part of the decorative scheme, and great care should be taken to achieve a pleasing effect. Glass columns which have some bearing on the general design of the interior may be used with success to impart a glowing

atmosphere. Natural bronze, chromium plate, and oxidised silver plate predominate in the modern range of fittings.

Large rooms often owe a definite amount of their artistic appearance to well designed cornice lighting. Many buildings have panelled ceilings with heavy ornamentations, and sometimes the desired effect can only be obtained by arranging special reflectors along the cornice, which tends to throw the rays of light to the opposite side. If the rooms are lofty and there is a wide area of plain ceiling, some form of trough reflector will give a form of light distribution which is particularly charming.

Indirect lighting may also be provided by wall urns or console brackets, especially where cornice lighting is not possible. A carefully planned installation allows for the maximum lighting result without undue glare appearing on the wall immediately above the unit.

The lighting of imitation windows in basements, &c., where daylight is absent, provides an attractive means of illumination. The reflectors should be concealed at the top of the windows which should be glazed with diffusing glass.

The illustrations are reproduced from photographs by the Edison Swan Electric Co., Ltd.

Steel Progress. By L. Sanderson

Some recent developments of interest to the electrical industry

THE laboratories of the great steel works are never idle, nor do research and experiment cease. The past twelve months or so have seen some interesting and important progress of value to the electrical industry. The development of the plastic materials, such as bakelite, erinoid, and the like, has placed at the disposal of manufacturers a wide range of new substances, capable of being employed for various components. Some of these parts have to be screw threaded to enable them to be fixed in position, and are punched out of a specific synthetic material.

The invention of the hobbing process, due solely to improved die steels, has enabled these parts to be produced much more cheaply and swiftly than ever before. In this process, instead of its being necessary to use a separate punch and die for each job, a length of the proper die steel is chosen and from this a large quantity of steel is machined away where the die is required. The edges of the hole are frequently countersunk. The metal, while in the cold condition, is next set under the punch and the die is formed under pressure, occasionally amounting to hundreds of tons. In this way, as many intricate dies as may be needed can be formed from the one individual punch, the entire operation taking far less time than is requisite for specially cutting each single intricate die. As in the original method to replace the worn dies new ones had to be cut by hand, it will be seen that much time and money are saved in this manner.

Stress must be laid on the fact, however, that it is only the introduction of superfine steel for making the punches and dies that has rendered this new plan possible. Attempts are now being made to perform the same job with the metal in the hot state, which will enable the cost of machining to be greatly reduced. A different steel for the punches is being designed, and will, it is believed, render this arduous operation feasible.

Alloys and Stainless Varieties

In the rubber industry the most striking advance has been the introduction of two alloy steels specifically designed for the spindles of riveting machines. These spindles have to be very hard, and are ground by machinery. The first steel for the purpose is an oil-hardening alloy which requires no tempering, and is therefore quite simple in its heat-treatment. It offers maximum resistance to wear. The second is a chromium-tungsten steel with a fine and dense grain. It has the ability to outlast a large number of spindles made from ordinary steel and, while of great hardness, is not brittle. One additional virtue it possesses is retention of temper under heat, a quality not often possessed by hard steels. Furthermore, it will withstand fatigue strains very well.

Stainless steels are being increasingly used in electrical plant and machinery, and developments in this direction have been numerous and important. For instance, selenium stainless steel is now used to replace stainless steels with a high sulphur percentage, the selenium giving the freer machining properties for the production of which a large sulphur content has hitherto been needed, without lessening the mechanical strength to the same extent as does sulphur. The deep-drawing quality of stainless steel intended for the making of articles which need to be deeply pressed out from fairly thin sheets, is another interesting advance. This ability to be deep-drawn renders it possible to obtain quite large parts or pieces free from welded joints.

Loud-speaker Magnets

Then there is the stainless steel containing a proportion of the rare element columbium, which is more resistant to intergranular corrosion than ordinary stainless steels, particularly after long retention at temperatures from 1,000 to 1,500 deg. F. Stainless steel wire has also been brought to a finer pitch of perfection than ever before. Electrically driven rolling mills are having their rolls cast from a nickel-chrome steel with a composition of 3 to 3.5 per cent. nickel and 0.45 to 1.75 per cent. chrome.

Permanent magnets for the wireless industry have been greatly affected by new discoveries. A year ago the "Mishima" nickel-iron-aluminium steels were referred to as the latest discovery. Since those lines were written, these new magnet steels have passed from the experimental to the production stage, and are actually being marketed overseas, though their use in this country is at the moment in suspense owing to negotiations concerning patent rights. These new magnets have been definitely proved to be lighter, better, and cheaper, than cobalt-steel permanent magnets, and it is but a matter of time before their use becomes widespread, with a consequent great reaction on the commercial radio sets of the future. Their one disadvantage is that they can only be supplied in the cast form, being too brittle for forging.

But even the "Mishima" nickel-iron-aluminium magnet steels are no longer the last word. Since their introduction, another Japanese metallurgist, Dr. Kotaro Honda, has introduced to the world a series of nickel-cobalt-titanium steels for the same purpose. These are known as "N.K.S." magnet steels, and contain 10 to 25 per cent. of nickel, 15 to 36 per cent. of cobalt, and 8 to 25 per cent. of titanium. It is claimed that for the smaller magnets these are the best possible steels, but their economic disadvantage is their rather high cost, due to the cobalt in their composition. Their magnetic properties, if the information at hand is accurate, are, however, remarkable.

Aluminium Die Castings

Even then the tale of permanent-magnet steel progress is not complete, for there is a report that Japanese scientists have produced permanent magnets of remarkable characteristics by employing sintered materials, i.e., magnets made from certain rare elements in powder form sintered together under heat.

Another striking advance is the manufacture of a number of alloy steels specially intended for the aluminium die-casting industry. Die casters have often been troubled by the surface cracking of their dies, due to the perpetual expansion and contraction of the surface layer of steel when heated and cooled in turn. This expansion and contraction set up fatigue. Corrosion and erosion are met with, and these, with the fatigue and a mechanical wedging action of alloy fins in these cracks, lead to breakdown. A number of steels containing a high proportion of certain alloys, such as chrome, have successfully eliminated these troubles. Twenty thousand aluminium die castings have been produced by one pair of dies made from a steel of this kind, and no cracks were visible on the surface of the die when the operation was finished.

In electrical steel castings there have been no sensational developments, and fabricated parts continue to compete to a great extent with high permeability steel castings for parts of dynamos and other machines. A point to be stressed, however, is the extent to which the heat treatment of electrical steel castings is increasing. Formerly, little heat-treatment was given to steel castings, but the large modern steel foundries are incomplete to-day without large batteries of annealing and heat-treatment furnaces and tanks, for the express purpose of putting their castings into the best possible physical condition after manufacture.

The Italian Electrotechnical Association

The thirty-ninth annual conference of the Associazioni Elettrotechnica Italiana is to be held in Gardone, Italy, from September 23rd to 30th next. Among the numerous papers to be read are one by Signor N. Ratti on "Disturbances in Hydro-Electric Machinery"; one by Signor S. Spagnoletti on "Vibration in Electrical Machinery and its Foundations"; and one by Signor I. Panara on "The Protection of the Milan Telephonic System against Electrolytic Corrosion."

Pumped Storage. By F. Johnstone Taylor

Its effect on water power development

A DAILY rather than a seasonal variation of load on a hydro-electric station is often well met by pumping back excess water into an artificial or natural reservoir

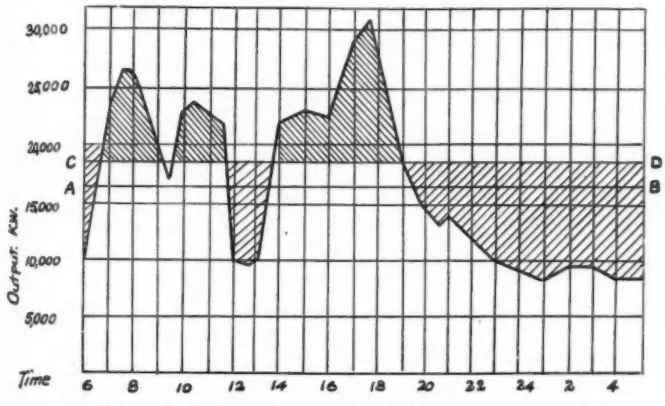


Fig. 1.—The effect of pumped storage on the load curve

to be used as required either by the main turbines or, if these are low-head machines, by special turbines.

A simple installation of this kind is that at the Walkerburn Mills on the Tweed, where a centrifugal pump is driven during the night by the mill's low-fall turbines and lifts water into an artificial reservoir whence it flows back to operate a 900-ft. 230-h.p. Pelton wheel during the day. The low-fall turbines work on a 10½-ft. head and are changed over from their dynamos to the pumps by a simple belt-shifting gear. The scheme was put down by Messrs. Boving in 1922 and appears to have served the owners well.

The higher the elevation of the reservoir above the power station the better, as the relatively small amount of water for a given output reduces the cost of the pipe line and other works and enables the power to be developed by relatively inexpensive Pelton wheels. Generally the use of low-fall turbines for pumping only is best as they are simpler and cheaper than those which operate generators also.

Probably the best use can be made of pumped storage in hilly districts where the water, for the most part, can be pumped up when the factory loads are off. Such plants may be advantageously installed to work in conjunction with steam units to take the peaks.

The characteristic curve of an electric power station in the Ruhr district during winter (fig. 1) indicates that the load varies about 400 per cent. The average load line A-B is about 16,000 kW and the maximum about twice that figure. The line C-D gives the average load when there is pumped storage. The two types of shading in the curve show the energy consumed in pumping and that available from storage which can be supplied for peak loads at high tariff.

The overall cost per kWh generated is reduced by this means since the turbines and generators are more evenly loaded. The losses are higher than they would be with a steam accumulator, and not much more than 50 per cent. of the pumped water is recoverable as electrical energy, but such schemes have proved economically sound especially for large plants.

In the Waldeck power station (fig. 2), equipped by Escher Wyss, there are four pumps dealing with 4.75 million gal. per hr. against a 980-ft. head and absorbing 29,000 h.p. at 500 r.p.m. Each set comprises a machine which serves as a motor or generator, a turbine and a pump; the output of the motor-generator is 36,000 kVA and of the turbine 40,500 h.p. The pumps are two-stage double-inlet sets with bronze impellors for the first stage, cast-steel ones for the second, cast-iron diffusers and a cast-steel casing. The central guide vanes are adjustable while the couplings are of the Fottinger type and the main valves of the Escher Wyss rotary type.

Messrs. Sulzer Frères claim credit for putting down the first installation of this kind as far back as 1894; this comprised a pump driven by a 75-h.p. turbine at a textile mills at Creva-Luino, Northern Italy. This pump served two reservoirs, one at 110 ft. elevation and the other at 210 ft., the former being pumped up as part of the day load and the latter at night and during week ends.

At Viverone, Italy, four pumps totalling 7,750 h.p. fill natural lakes at the rate of 66 million gallons in twenty-one hours, whence the water with a fall of 460 ft. is available for peak loads. The power unit comprises a spiral-cased Francis turbine, a generator which can be run as a synchronous motor and the pump. The three components

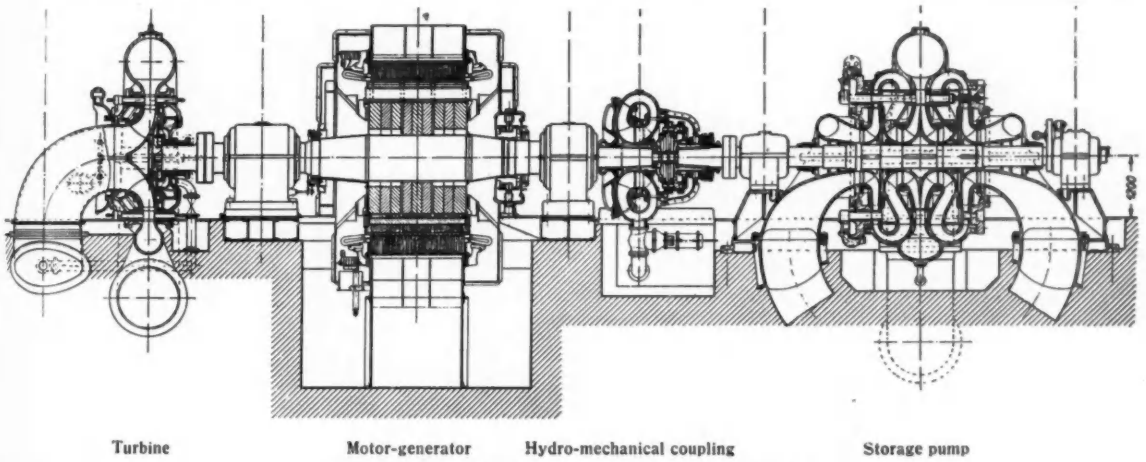


Fig. 2.—A pumping set at the Waldeck power station

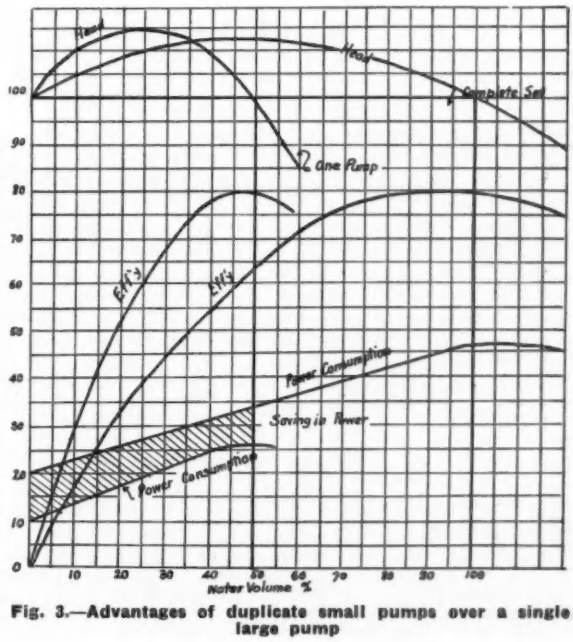


Fig. 3.—Advantages of duplicate small pumps over a single large pump

are coupled by means of clutches so that the motor can either operate the pump or be driven by the turbines when the latter is supplied by pumped water. The electrical unit when operating as a motor can be brought up to speed by the turbine, and when correct speed is reached the current is switched on to it, the turbine is declutched, the delivery pipe opened and the regulating valve adjusted.

At the Tremorgio station, the load on which fluctuates between 4,000 and 10,000 kW, the motor-generator is geared

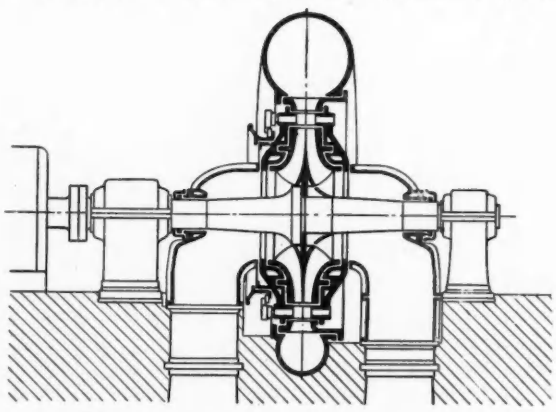


Fig. 4.—A pump with adjustable guide vanes

to two similar pumps which operate independently of each other, each pump being designed to deliver 5,640 g.p.m. against a head of 3,035 ft. at a normal speed of 1,000 r.p.m. When employing one single pump the efficiency at half load is 62½ per cent. and at quarter load 36.5 per cent. (see fig. 3). Assuming a full-load efficiency of 80 per cent., if one half of the pumping unit is switched off, the half-load efficiency attains the full value of 80 per cent. while the quarter-load efficiency is 62½ per cent. The saving in power is indicated by the shaded portion of the graph.

Pumps with movable diffuser vanes have met with approval. The vanes can be moved from the full open to the full closed position to improve the pump efficiency at part loads by the elimination of the impact losses associated with fixed blades under such conditions and to reduce the current taken at starting. A servo motor closes the guides automatically when the speed of the pump drops below a predetermined limit, constituting a safety device without automatic valves which is claimed to protect the plant from any effects of pressure rises. A section through one of these pumps at Niedawartha is shown in fig. 4.

Reflux valves of the usual flap type are generally unsuited to pumps operating under the conditions cited. So long as the pump is working normally, the whole column of water moves uniformly towards the reservoir; when the set is closed down this motion will continue due to inertia resulting in a reduction of pressure at the pump outlet. The reversal of flow will cause a rise of pressure at the same point, as the flap valve by tending to close too late is suddenly thrown on its seat. This can be avoided by a hydraulically controlled stop valve which will automatically close the pipe line when the pump pressure falls so as to prevent the water flowing back through the pump and driving it as a turbine.

Particulars of the principal installations are enumerated below:

Plant.	Turbine h.p.	Pump h.p.	Head ft.	Type.
Small Plants—Pump storage only				
Fridingen	2,250	1,860	—	h.c.
Reutlingen	2,000	1,500	443	h.c.
Mitweida	2,000	1,086*	397	h.s.
Merkenbach, near Giessen ...	2,470	1,620	—	h.c.
Large Plants—Pump storage only				
Niederwartha	120,000	100,000	485	h.c.
Herdecke	194,000	102,000	541	h.c.
		136,000†		
Bringhausen	164,000	116,000	984	h.c.
Pump storage supplementary to hydro-electric development				
Zweribach Station	1,600	1,000	—	h.c.
Schwarzenbach	62,500	25,100	738	h.c.
Hemfurth	23,500	15,700	123	v.c.
Leitzach Station	—	16,000	426	v.s.
Schluchsee	184,000	105,000	656	v.c.
Totals	758,320	623,666		

h = horizontal, v = vertical, c = combined, s = separate.
* Pumps driven by l.p. turbines. † A fourth 34,200 h.p. pump will later be added to the fourth machine unit.

Pumped storage has not, so far, received any great attention in America, but in Vol. 94 of Trans. Am.Soc. C.E., Mr. Markwart sums up the economics of such schemes as follows:—

"The economic limit for capital expenditure for a pumped storage plant is the capitalised annual charges of a steam plant operating under similar load conditions as follows:—(1) In the event that the off peak load energy is supplied by run-of-steam hydro-electric plants, the limit will be the annual cost of a kW/year of equivalent steam power capitalised at the annual percentage cost of a hydro-electric plant. (2) In the event that the off-peak energy is supplied by steam plants the limit will be the annual cost of a kW/year of equivalent steam power minus the annual cost of the fuel burned to supply one kW of pumped storage peak capitalised at the annual percentage cost of a hydro-electric plant."

Southend Illuminations

VISITORS to Southend-on-Sea at this time are able to enjoy the remarkably effective illuminations, the switching on of which was described in a recent issue of the ELECTRICAL REVIEW. This year the artistic lighting effects are on a more extensive scale than hitherto, and will continue nightly until the second week in October. There are nine zones of illumination; the outstanding one is the Cliff Gardens, in which the skilful blending of coloured lights redounds greatly to the credit of Mr. A. C. Johnson, the borough electrical engineer, and his staff. Approximately 130 flood lanterns up to 1,000 W are used in this area. Large centre trees are lighted so that the colours constantly change. West of the cliff lift an illuminated pylon has been erected and incorporates mechanism to give a flame effect in various colours.

About 120 decorative lanterns are suspended from the branches of trees near the Esplanade restaurant, and on the cliffs behind are three nursery rhyme characters, including an illuminated butterfly which has a device simulating the movement of wings. Another distinctive lighting scheme is a bower illuminated by nearly 1,200 flame and ruby lamps, and there are also the floodlighted Prittlewell and Leigh churches and the war memorial, the lighting on the scroll work on the shelter west of the floral hall, the centre shrubbery and illuminated archway (Western Parade) and the sunken gardens.

The cliff gardens on the left are illuminated in artistic colours and the shelter is indirectly lighted

The Scarborough Open-air Theatre

THE Scarborough Open-air Theatre is said to be the only permanent open-air theatre in the British Isles. The theatre was built at a cost of £60,000 and is situated in the North Bay Pleasure Gardens. The stage is an island in the middle of a lake. Twenty feet of water separate it from the audience, whose seats rise almost sheer from the water's edge. There is seating accommodation for 6,000 people, all of whom have a clear and uninterrupted view of the stage. The building of this remarkable theatre was the result of a happy accident. It was discovered that the acoustic qualities of this natural valley made it ideal for theatrical work.

An impressive scene in "Hiawatha" at the Scarborough Open-air Theatre

A great many structural alterations have been made to this island stage since last year's performance of *Tom Jones*. The lighting engineer's rooms and switchboard have been moved back, so that all may hear perfectly. In the past these have sometimes obstructed the view and hearing of those seated at the extreme left edge of the theatre. New dressing-rooms for the artistes and chorus have been built at the back of the stage, some of them actually being below waterline.

When the Corporation produced *Merrie England*, a definite scheme of illumination was prepared by Mr. E. J. Jarvis, A.M.I.E.E., A.M.I.Mech.E., the borough electrical engineer, to meet the requirements of this particular production. This consisted of banks of floodlights up to a total capacity of approximately 120 kW. These units were controlled by a specially designed switchboard, which incorporated dimmers of such design that almost any colour combination and stage lighting effect could be obtained. This lighting was further improved for the production of *Tom Jones*, when some 50 or 60 kW of additional lighting was added.

For the production of *Hiawatha* this year, where for the most part the entire chorus is on the stage, the real difficulty of illuminating an outdoor stage was experienced, namely, the difficulty of obtaining sufficient "top" light in order to cut out all shadows. Mr. T. C. Fairbairn, the producer, has been in charge of this year's production at Scarborough. He found that the Scarborough Open-Air Theatre was a much more natural setting for the pageant than the Albert Hall where *Hiawatha* has become almost an annual event. The funeral procession of Minnehaha takes place on the waterfront, and the grand finale of the spectacle is the scene in which Hiawatha is spirited away in a canoe into a blazing sunset at the extreme end of the stage. This scene is illustrated in the accompanying picture.

Additional lighting effects have been secured by means of four large searchlight projectors, using 10-kW metal filament lamps in each and focusing by means of silvered parabolic mirror reflectors similar to those used in service searchlights. By means of these, a tremendous light throw is obtained from the top of the auditorium, a distance of 400 to 500 ft., and the great penetrating power of this particular type of lamp enabled a large variation of colour to be given to the entire stage effect.

The total stage lighting for the production of *Hiawatha* is well over 300 kW, and the special scenic effects of the snow coming over the top of the snowclad hills is obtained by means of specially designed snow effect lanterns. The remarkable success of this opera-pageant is shown by the fact that for the first ten performances 62,000 people paid for admission, against 40,000 for a similar period last year. The gross receipts for the first ten performances were £7,093, against £5,021.

Petrol and Electric Battery Vehicle Costs

IT is remarkable, says H. Köhlmann in *Rea*, the organ of the German Association of Electricity Consumers, that electricity supply stations and electrical manufacturers have made such little headway in securing the general use of electric battery vehicles for delivery service in and near towns, a purpose to which they are ideally suited. A substantial proportion of the 700 million marks (£35,000,000 at par) expended annually on imported motor fuels required by the "petrolisation" of German transport could be saved by the use of electricity generated from native fuels and the load factor of central stations would be improved materially. In service capabilities the electric vehicle is of proven superiority, while as regards the alleged publicity value of a handsome petrol vehicle it is only a matter of coachbuilding to make electric vehicles equally attractive.

The accompanying table gives comparative running costs (at 20 marks = £1) for two-ton battery and petrol vehicles, taking the first cost to be £300 in both cases, including a proportionate share of the charging equipment in the case of the electric vehicle.

On the basis of 11,250 miles per annum, with an average load of 1½ tons, the total running cost, including capital charges, is thus 3.1d. per ton-mile for the electric and 5.2d. per ton-mile for the petrol vehicle, or about 12s. and 20s. per day, respectively, for an average of 31¼ miles with 1½ tons average load.

Technically and from the operating standpoint, says the author, there is no reason why the number of electric vehicles in use should not be increased many thousand-fold. With any such an increase in the number of vehicles, the provision of public charging stations at electricity depôts, railway stations, and elsewhere would be simple and remunerative. The sale of electric vehicles without batteries and the arrangement of a hire-service of batteries from central stations would be a further favourable development. Commercial firms would find their delivery transport services greatly simplified and cheapened, while as regards electrical manufacturers and supply stations the opportunity is one of the greatest now before them.

A COMPARISON OF ELECTRIC AND PETROL VEHICLE COSTS.

Electric.	£ s.	Petrol.	£ s.
Interest, 4 per cent. ...	12 0	Interest, 4 per cent. ...	12 0
Depreciation, 10 per cent., excluding accumulator ...	22 10	Depreciation, 20 per cent. ...	60 0
Battery renewals	25 0		
Insurance	7 10	Insurance	25 0
Garage	6 0	Garage	18 0
Repairs	5 0	Repairs	25 0
Drivers' wages	104 0	Driver's wages	156 0
Battery attendance... ...	6 0		
Tyres and oil	7 10	Tyres...	9 0
Charging, 9,000 kWh at 0.6d.	22 10	Petrol and oil	65 0
Total, excluding tax ...	£218 0	Total, excluding tax ...	£370 0

Domestic Installations. By E. H. W. Banner, M.Sc., A.M.I.E.E.

The importance of correct fusing

As a result of many years of experience with an all-electric home I have formed the opinion that, generally speaking, electricity is likely to be economical if the running charge of a two-part tariff is 0.5d. per kWh and the all-in charge between 0.6d. and 0.8d. per kWh. Even if the house be not quite all-electric, the over-all price should not exceed 1d. per kWh.

For any domestic installation that includes more than lighting, the contractor should prepare a wiring diagram of the circuits with the sizes of the wires, to be pasted on or near the distribution board as a permanent record; this would be useful to a contractor when extending the wiring or increasing the installation. In too many cases circuits meant for electric irons or vacuum cleaners have 15-A sockets, which gives the false impression that they may be suitable for 2- or 3-kW fires.

The weekly load curve of an all-electric house

An integral part of the wiring diagram should be a table of fuse wires for each circuit. The inside of the cover of the distribution board should be provided with a white surface with the "ways" of the board shown, the remainder of the circuit being filled in as completed, together with sizes of cable and fuse wire to be used.

If a distribution board of, say, eight ways and 15 A per way be used there is a tendency to fuse all circuits to blow at about 30 A. This is bad practice; lighting circuits rarely provide such a high load and should be fused with smaller wire. Probably the best plan is to total the loads on each circuit, add 50 per cent. and call that the carrying current of the fuse wire required. The fusing current may then be taken as twice this and the nearest size of wire used. Very small power circuits such as mains radio sets and mains clocks should have individual fuses of the fused-plug type; these can be obtained from several sources and are strongly to be recommended. Rarely does either have its own circuit from the distribution board, and even so the usual fuse holder will not easily hold wires suitable for such small currents. Supplies of fuse wires of the sizes shown in the table should be kept alongside the distribution board. Generally, the main fuses will be rated lower than the sum of the individual circuit loads as all circuits are not in use at once.

Plugs and Adaptors

All electrical gear should be provided with an earth terminal to be used if required. Shielded plugs are to be preferred (unless the socket is switch-controlled) to prevent contact with the half-inserted plug.

The live parts of the metal-shielded plugs are entirely shielded by earthed metal (provided the shield on the socket is correctly earthed), but they could, I suggest, be improved by providing insulation *outside* this earthed shield so that in living rooms where no water pipes are accessible no earth connection need be made to the apparatus and risk of shock is thus avoided. This risk is present if non-earthed apparatus breaks down so that the frame becomes alive, and is held whilst the earthed shield of the plug is pushed in. A further suggestion is the universal use of the side-entry type of plug, as there is a tendency for the user to pull out the central-entry type by the flex. The common practice of supplying small electrical apparatus with lamp adaptors is strongly to be deprecated, as the use of electricity is limited to *either* the lamp or the appliance.

Adaptors consisting of one lamp adaptor and two lamp-holders, one with a switch, assist matters, but the only real way is to have plenty of sockets, particularly in the kitchen where an iron, milk boiler, kettle, &c., are frequently required without disturbing the lighting. The use of multiple plugs is less satisfactory than sufficient sockets, two or three of which may be paralleled on one way from the distribution board if their total loading is only a few amperes.

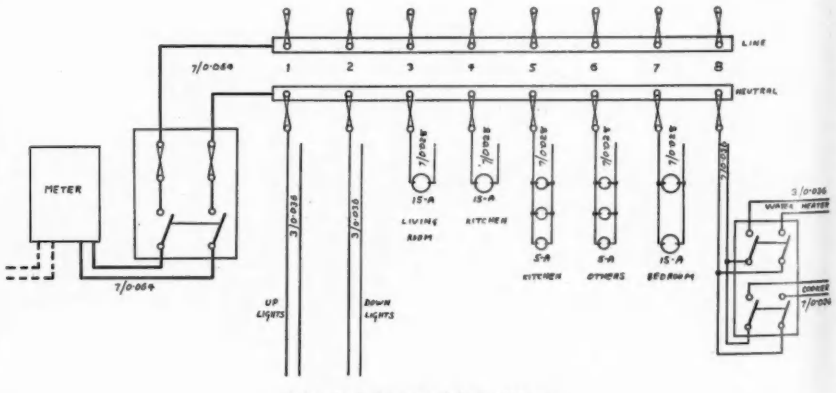
My own arrangement is to use 15-A sockets on separate ways for the fires and 5-A sockets grouped for the smaller devices. In this way several appliances can be used simultaneously without interfering with the fire and lights. The clock has a permanent socket of its own with a fused plug. The remainder of the plugs and sockets are arranged to prevent the plugging in of a fire on a small-power circuit or a kettle on a higher-fused fire circuit.

Whilst plugs and sockets are more or less standardised there appears to be no such standardisation for connectors. My appliances are of various makes, and at first three different connectors were required. One of these has been altered to fall into line with another, but there are still two sets of connectors, with different centres, which have to be sorted out for use. This is no trouble when one is used to it, but it is bad for the universal adoption of electrical appliances, as such apparatus as a kettle cannot conveniently be kept with a length of lead permanently connected to it.

The Bathroom and Kitchen

In my bathroom I have fixed a bowl fire on the wall at about 7 ft. above the floor, with the beam sloping downwards. Its insulated switch is near it, but well away from the bath, and the circuit is connected directly across the lamp terminals; in this way the lamp acts as a pilot. The existing light switch had to be replaced as it arced badly on a fire circuit of even 3 to 4 A. This arrangement has worked well for several years, but would not be suitable for more than 600 W, as the load is on the lighting fuses and wiring. Switches outside the bathroom are certainly safer but inconvenient, especially if no pilot lamp is used.

A self-contained frying pan is still needed. With the usual frying pan there is a heat loss due to poor contact with the hot-plate. I purchased two specially constructed frying pans but neither has remained flat for long.



A typical house-wiring diagram

A useful addition to cookers would be a large window in the front of the oven. This has been done experimentally but, so far as I know, it is not supplied with any make of cooker normally listed, although a gas cooker is now marketed with such a window. Much waste of heat would be obviated by this addition. The provision of a bimetallic thermometer inside the oven with its scale visible through the window should be cheap and satisfactory—more so than drilling the front plate to bring the stem of the mercury-in-glass thermometer outside. If comparative heats are indicated they should preferably be universal.

The following particulars relate to my own installation, which comprises five fires, 8.6 kW; cooker with boiling plate and grill plate, 5.85 kW; kettles, toaster, and milk boilers, 2.05 kW; vacuum cleaner, iron, radio and clock, 0.5 kW; water heater, 0.9 kW; lighting, 0.9 kW; total, 18.8 kW. The probable maximum instantaneous demand is 12 kW and the average continuous load 0.756 kW.

The annual consumption is 6,621 kWh costing £18 7s. 5d., the average price per kWh being 0.655d. The average consumption per week was 127.3 kWh, with a maximum of 325 kWh. Included in these figures is the energy used by the water-heater, 1,758 kWh, costing £4 16s.

The weekly load curves indicate periods at Christmas and in June when the house was unoccupied. The effect of the water heater is to raise the whole curve as the energy used varied little throughout the year.

The British Association

Addresses and papers at the Aberdeen meeting

THE meeting of the British Association for the Advancement of Science that opened on Wednesday is the third to be held at Aberdeen. The presidential address of Sir James H. Jeans, who took the place of the late Sir William Hardy, was on "The New World-Picture of Modern Physics." He showed how the Newtonian mechanics dealt with only a small fraction of the universe, the inconceivably great and small being equally beyond its ken and gave no answer to the question as to what would happen next.

The "particle-picture" of the universe postulated the existence of matter in space and time; it was a materialistic view, and was found by Bohr (in 1913) to be inconsistent with the type of motion of the two particles of the hydrogen atom required to produce the spectrum of the gas, which seemed to be governed by the laws of probability. This led to the preference for the "wave-picture" which lay entirely outside space; this has proved to provide the more truthful view of nature.

The new physics, the general thesis of which was that the nature we study did not consist so much of something we perceived as of our perceptions, had got rid of mechanistic determination but at the price of sacrificing uniformity in nature. Mind and matter, if not proved to be of similar nature, were found to be ingredients of a single system. The new wave-picture, which transcended time and space, regarded a shower of parallel moving electrons as a continuous electric current. A similar picture might be true of the cells of our bodies and also of our minds.

Aberdeen, where the British Association is holding its meeting this year. Below is the Bridge of Balgownie, one of the beauty spots of the district

Science and Civilisation

Discussing the practical effect of science on civilisation, Sir James emphasised the impossibility of forecasting whether an invention would result in merely saving labour or in starting a new industry to provide employment; if science were throttled down neither would result and civilisation would only stagnate. In respect of knowledge each generation stood on the shoulders of its predecessor, but in respect of human nature both stood on the same ground. The present need was for industry-making, not labour-saving, discoveries.

From the point of view of everyday electrical practice the most important of the sectional presidential addresses was that delivered by Prof. F. G. Baily on "Sources of Cheap Electric Power" before Section G (Engineering) on Thursday. He advocated the generation of electricity at the pit-head from the lowest grade coal, which might be up to 10 per cent. of the total coal raised. His main points were as follows:—Two-thirds (excluding London, four-fifths) of the population of Great Britain live within forty miles of the coal fields, which is an easy transmission distance, especially having regard to the existence of the grid.

About 6 per cent. of the coal raised is used to provide power at the mines, but at pits where it is efficiently burned only 1.25 per cent. is so used. At an overall price of 5s. per ton at the cleaning floors in most districts, 10 per cent. of the coal raised would yield 18 million tons per annum with an average calorific value of 10,000 B.th.u.s per lb., which is 50 per cent. more than is now used in all generating stations giving a public supply.

The greater part of the coal raised comes from pits that can be grouped (though smaller isolated pit stations should be connected to the grid) and the coal brought to a central point for cleaning. Taking waste coal at 10 per cent., a 100,000-kW station with a 40 per cent. load factor would use 700 tons of waste coal per day from a normal 9,000 ton per day cleaning plant.

Cheapness of land would offset increased distribution costs and a saving would be effected in avoiding the need for eliminating sulphur and dust. An existing 4,000-kW pit-head station (two sets) working at a load factor of 0.7 uses coal containing 40 per cent. of ash and moisture which is valued by the colliery owners at 3s. per ton, equivalent in value to a good steam coal at 4s. 6d. The consumption corresponds to 1.5 lb. of steam coal per kWh delivered even without a supply of condensing water; the cost, including capital charges at 9.5 per cent., is 0.137d. compared with 0.185d., which is an average figure for large stations. This station works in conjunction with the supply company and delivers excess power into its mains.

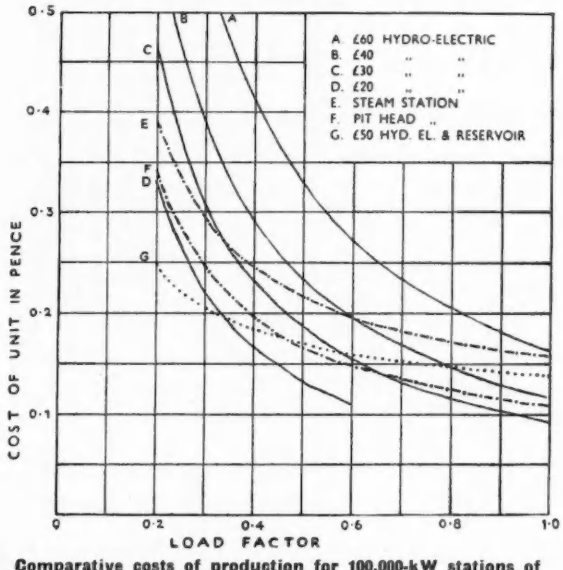
The gain due to a high vacuum pressure is raised, and at 350 lb. becomes less as the boiler the loss of power, due to a back pressure of 1.5 lb. (with cooling towers) instead of 0.5 lb., is theoretically only 5 per cent., and in practice is barely 4 per cent. Hams Hall station (Birmingham), which relies entirely on cooling towers, has 30,000-kW sets running at a load factor of 0.32 and consumes 1.32 lb. of steam coal per kWh, giving a thermal efficiency of 23.34 per cent. on kWh generated.

[*Elliott & Fry*

Sir James H. Jeans, the President of the B.A.

Low pressure steam (50 lb. per sq. in.) for industrial processes can be obtained by passing steam with an initial pressure of 350 lb. per sq. in. through turbines the additional coal required to produce the higher pressure works out at 0.4 lb. per kWh, and the capital costs for the additional plant are not more than half those of a complete plant in a supply station. The electrical output is fixed by the amount of process steam needed, but if connected to the grid the irregularities can be smoothed out. The use of coke-oven and blast furnace gases is also discussed.

The accompanying curve for a 100,000-kW station shows that at all load factors the cost of output from the pit-head station is 0.05d. per kWh less than that of a normal station. Interest is taken at 6 per cent. and depreciation at 3½ per cent. The cost per kW of the normal station is £14 and of the pit-head



Comparative costs of production for 100,000-kW stations of various types

station £15. Coal of 11,500 B.th.u. is 13s. per ton and waste coal of 10,000 B.th.u. is 5s. Wages and maintenance are assumed to be the same for both, and rates and taxes, office and general expenses are omitted.

For the water power stations all running costs are taken at 14s. 6d. per kW per annum, compared with 18s. for the steam station at 0.7 load factor and 15s. 8d. at 0.4 load factor. Interest is assumed to be 6 per cent. and depreciation 2½ per cent. To compete with a normal steam station the cost per kW is limited to £32 and with a pit-head station £25, disregarding all questions of transmission.

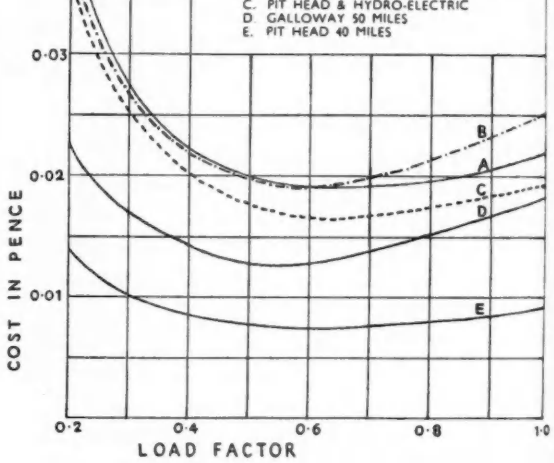
In the curves of cost of a 100-mile 132-kV transmission system, interest is taken at 3¾ per cent., repayment in thirty years, and annual upkeep £20 per mile, or 6.75 per cent. overall. The voltage drop at full load and 0.8 p.f. in line and transformers is 10 per cent., and core losses 1.25 per cent. Rail transport of coal costs 1s. per ton mile plus 6d. for terminal charges and wagons or 8s. 10d. for 100 miles. Allowing 1.3 lb. per kWh the cost is 0.061d., which is three times that of electrical transmission at 0.4 load factor. Carriage by sea from Newcastle or Fife to London costs about 4s. per ton, so that electrical transmission to London from the nearest existing pit (120 miles) will cost nearly as much as carriage by sea. Professor Baily concludes that all extensions of power station plant should be made at pit-heads under central control.

In a discussion yesterday in Section A (Mathematical and Physical Sciences), opened by Prof. E. V. Appleton, the observations of the British wireless expedition to polar regions were examined. These appear to indicate that the theory due to Appleton that the main ionising agency for the E and F regions of the ionsphere is ultra violet light from the sun and the theory due to Chapman that charged particles from the sun may produce ionisation in the upper atmosphere are both necessary to account for the phenomena, but that the relative importance of each is doubtful.

Three papers were read on the quantum theory of metals, in which it was shown that the observed resistance of alloys leads to a better understanding of the resistance of pure metals.

In Section B (Chemistry) Dr. H. de Laszlo described the simplified technique of obtaining photographic records of the scattering of fast beams by vapours and gases. The electron-diffraction method is claimed to provide an accurate tool for the determination of chemical structure in the vapour phase.

Mr. W. T. Halcrow's paper before Section G (Engineering) on "Scottish Hydro-electric Stations" dealt with the water-



Comparative costs of 100-mile 132-kV transmission systems

power resources of the British Isles as a whole. The three main types of development in Scotland are: (1) those working on a fully regulated flow at constant speed; (2) those on a fully regulated flow but with a varying load and used for general purposes; and (3) those with a partly regulated flow, having little or no storage and worked in conjunction with steam stations.

The author discussed the relative advantages of steam and water power stations, and claimed that the cost per kWh was considerably less than that of a steam station of similar capacity and load factor.

"The Magnetic Field of a Rotating Cylindrical Magnet—a Perennial Chimera," was the title of a contribution to the proceedings of Section G by Prof. G. W. O. Howe, D.Sc., yesterday. "Does the magnetic field of a cylindrical bar magnet or solenoid rotate with the magnet or solenoid?" is a question that is often asked. Experiments have been made with the object of finding an answer, but, said Prof. Howe, the question is meaningless and the experiments are all based on a misconception and on a fallacious non-Maxwellian law of electromagnetic induction, as he pointed out nineteen years ago.

Professor F. G. Baily, President of Section G—Engineering

The lines of force and tubes of magnetic induction are mathematical abstractions and there is no ground whatever for picturing a magnetic field as possessing any fibrous or tubular structure

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Lightning Effects

I have recently arrived in England on leave and naturally I am interested in electrical matters in this country, particularly in interruptions in the supply such as those which have recently been experienced in connection with the grid system. As Director-Adviser of Electricity under the Federated Malay States Government I am responsible for all Government electrical undertakings throughout the country and for the administration of the Electricity Enactment. An account of how some of these problems are tackled in the Federated Malay States is given in the cutting from the *Malay Mail* which I enclose.

I received a letter this morning from my mains engineer, Mr. R. Hugh Jones, M.Sc., A.M.I.E.E., enclosing this cutting and stating that the account is reasonably correct, considering that it was published by an ordinary daily paper. He, however, objects (and rightly so) to the designation of "electricians" which is usually associated with skilled workmen who fix up electric bells and other sundry apparatus.

Severe lightning storms are a daily occurrence in our part of the world, and I can assure you that tropical thunderstorms are more terrifying than even the worst which are experienced in this country.

In spite of their severity interruptions are rare, as a stoppage of tin-mining operations owing to the failure of the supply is an unpardonable offence. I hope, however, that those responsible for the operation of the grid will not be discouraged by these preliminary failures as they can be reduced to minor occurrences with better protection and more experience of the workings of a large overhead system.

W. J. WILLIAMS, M.I.E.E., M.I.Mech.E.,

Whitley Bay, *September 1st.*

[In the newspaper cutting an account is given of a novel use for an aeroplane. We refer to this in our leading columns.—EDS. ELEC. REV.]

The Olympia Proposal Renewed

After ten days of Press publicity the organisers of the Radio Exhibition have made Britain and the world radio-conscious. This splendid effort to keep radio trade developments before the public through the daily newspapers recording the new triumphs has helped to find new markets. Such an effort required courage to launch initially, and no doubt the usual cautionary elements of the trade were sceptical about its success.

It is now a national annual and an asset to the radio trade. After "Radiolympia" why not "Electrolympia"?

The electrical industry is of importance to everyone in the world to-day and its new developments are not second to any etheric marvels as a matter of public interest. Who will lead this much delayed effort to have the British public and the world generally made conscious of the new developments of the British electrical trade?

There is a great work to be done here to persuade the many units of the electrical trade to combine and establish a "shop window show" at Olympia annually. Despite the statements that the various shows at which electrical goods are shown afford sufficient publicity for the electrical industry, I contend that the industry needs a much more prominent place than as a mere component part of the British Industries Fair, the Ideal Home Exhibition, etc.

The British Electrical Development Association could find much real scope for its talents in organising such an exhibition as "Electrolympia." We should not hide our light behind other associations' efforts; we should ourselves demonstrate to the world the new developments which electricity annually perfects as its contribution to the world's progress. Unity of effort will soon overcome apathy and pessimism and "Electrolympia" will then be assured. Who will sponsor such a great electrical publicity effort directed to the users of electrical power and apparatus? M. C. TONER.

London, S.E.19. *Aug. 28th.*

Double-ended Motors

Can you or any of your readers tell me why the makers of electric motors have all down the ages turned out their standard machines with the shaft extension on one side only?

Why not an extension on both sides? There are many instances when both sides of the motor could be worked in. We have steam, gas, petrol and other types of engines fitted with shafts suitable for two flywheels. Why then can't we have motors the same? SIMPLE LADDIE.

August 31st.

A Satisfied Consumer

My husband and I own a general stores in a seaside village. We are four in family, but during the holiday season we let rooms and cater for up to five additional people. Our electrical installation comprises a cooker (of the size known as the "four to six persons" type and hire-purchased from the supply authority), kettle, iron, wireless set, and the lighting for the shop, stores, sitting-room, kitchen and three of the bedrooms.

In the cooker I make cakes, jam sandwiches and buns for sale over the counter as well as for the household. Recently I baked a four-tier wedding cake. I could only do two tiers at once. The first two took 4½ hours, the second two 3¼ hours at a temperature of 375 deg. The result was all that could be desired—not even a currant was burned. The total consumption of electricity from 11 a.m. until 7 p.m. was only 5 units, costing less than 4d., during which time vegetables were also boiled on the hot plate and the kettle boiled five times.

Electricity is supplied on a two-part tariff. The fixed charge is £1 0s. 8d. per quarter and all units costs ¾d. each. In the heaviest quarter, last winter, we used 398 units and the total bill was only £2 5s. 7d., which was equal to about six units a day.

I have no bias in favour of any particular method of cooking, but, speaking from experience, I have no doubt whatever that electricity provides the cheapest, cleanest, easiest, and most satisfactory means known. Cooking and baking by electricity is not work—it is pleasure.

MABEL BILLINGS.

Sandgate, Kent, *Sept. 2nd.*

The British Association *(contd. from opposite page)*

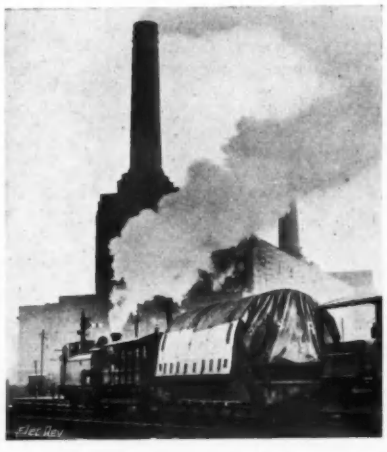
whereby a meaning can be given to any question of its movement when there is no change in the value of B at any point.

Conductors, or parts of a conductor, can move relatively to one another through magnetised space, but to say that space—whether magnetised or not—or an unvarying conditions of space is moving past and cutting a conductor is meaningless and cannot be justified by endowing with physical reality such mathematical fictions as lines of force.

[H. J. Whitlock & Sons

Professor G. W. O. Howe

Those who make experiments seeking to detect such movement invent or adopt a special law of electromagnetic induction. Having materialised the tubes of magnetic induction they then assume that if they move and cut conductors electric forces will be induced in the conductors. Such an assumption is not only quite outside Maxwell's theory but is contrary to it. One writer who recently confessed to having made about fifty experiments admitted that "as experiments they are not conclusive." The results of the experiments were foregone conclusions to anyone who has freed his mind from materialised lines of force.



We mentioned last week the transport of a 40-ton stator from the Metro-Vick works, Trafford Park, to the Battersea power station. Our picture shows it at the power station sidings upon its arrival last Sunday morning

Advising Consumers. By S. F. Osborne

The economic choice of domestic apparatus

AT the present time there is much room for improvement in the design and efficiency of domestic apparatus, and where the price of electricity is high, the extra first cost of more efficient apparatus is soon saved by the reduction in running costs.

Improvement of design is not altogether the responsibility of the manufacturer or designer of the apparatus. Manufacturers say that they are perfectly willing to design and provide apparatus with a higher efficiency if they can find a market for them at the increased cost: it is therefore the responsibility of the electrical contractors and the sales staff of the supply undertakings to educate the consumers on the real value of efficiency and thus create a demand for the improved designs which manufacturers have to offer. The energy consumed by most domestic apparatus costs as much in one year as the apparatus costs in ten years: if this was realised by the purchasers they would not hesitate to pay the extra cost of the increased efficiency.

Jerome, Ltd.

Mr. S. F. Osborne

Electric Cookers

There are several ways in which the cost of cooking can be reduced. According to the manufacturers and many users of the open type transformer-operated boiling rings, the saving in consumption over the ordinary enclosed type plate is quite sufficient to warrant its inclusion in most cookers. Whether the saving in running costs during the life of the ring is greater or not than the additional first cost, depends of course upon the extent to which it is used. In any case the increased speed in boiling would be greatly welcomed by many consumers. There are still many consumers with electric cookers who still use a gas ring for quick boiling although they could, if correctly advised, obtain the same speeds, even with the enclosed type plate.

Perhaps the greatest reduction in running costs in electric cooking can be effected by the fitting of an oven thermostat. We are so often told by the "cooker prospects" that they have "got so used to the 'Regulo'" on the gas cooker that they could not do without one. There is no reason why they should now that we have the equivalent for the electric cooker.

Tests taken show that the running costs of an electric oven have been reduced by 50 per cent. by fitting an oven thermostat. The amount of saving in actual practice would of course depend upon the skill in handling the hand-controlled cooker. The saving, however, would not have to be great to exceed the extra cost of the thermostat—between 15s. and £1. Against this there is the saving in the cost of an oven thermometer together with the difference in cost of the single-way switch against the three-way switch and necessary wiring. Allowing for these items it can be seen that the increase in the cost of a cooker due to fitting a thermostat is very small, particularly as thermometer replacements account for a very large portion of the expense of cooker maintenance.

In my opinion in the interest of the consumer as well as that of the supply undertaking, all cookers for hire should be fitted with oven thermostats, and transformer-operated boiling rings should be supplied as optional, with perhaps a slight increase in the hiring charge.

Water Heaters

Not much more can be expected from water heater manufacturers in the way of efficiency and it is the duty of the supply undertaking to see that the consumer gets the apparatus most suitable for the job. In view of the large surface area of square and rectangular tanks compared with cylindrical ones, there is usually a corresponding reduction in efficiency. The minimum surface area of a cylindrical tank of a given capacity is obtained when the diameter of the tank is approximately equal to its height, and though a tank of this shape would be impracticable, any tendency towards these proportions leads to increased efficiency over those having small diameter compared with their height.

Though most manufacturers recommend the 12-gal. size heater as being of sufficient capacity to supply bath and kitchen sink, it is often well to point out to the prospective consumer the advantage and increased efficiency of a larger heater with the water stored at a lower temperature. Information obtained from a large number of undertakings shows that the average price for the hire of a 12-gal. heater is 5s. 6d. against 7s. for the 17-gal. size. Assuming that a consumer required the equivalent of 12 gals. of water at 180 deg. F., the 17-gal. heater could be supplied and the thermostat set at about 130 deg.

At these temperatures, according to figures supplied by water-heater manufacturers, the standing losses of the 17-gal. size are only about 60 per cent. of those of the 12-gal. size. With electricity at ¾d. per kWh, the installation of the larger heater would result in a saving of about 4d. per week or 4s. 4d. per quarter for energy against 1s. 6d. increase in hire charge. The same reasoning holds for other size heaters. The advice should, therefore, be "large heaters set for low temperatures."

In cases where the run of pipe-work to the kitchen sink is more than 12 ft. it would pay to install a separate heater in this position especially if the water is drawn at the sink rather frequently. A saving in running costs can also be effected by advising the consumer, when using water for bathing, to put the requisite amount of cold water into the bath before turning on the hot tap, as by so doing the radiation losses are reduced. This is quite a small point but it is quite worth remembering, especially where the price of electricity is high.

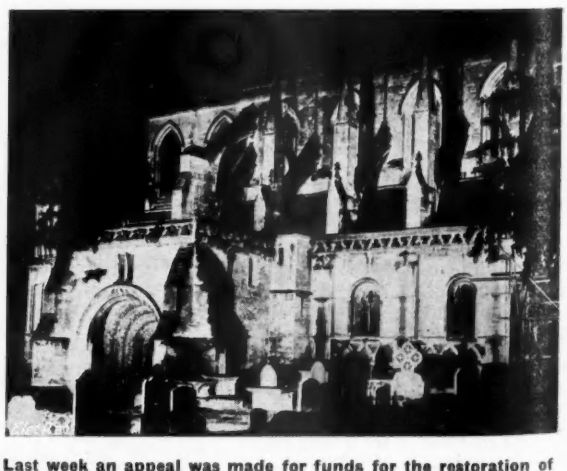
Small Apparatus and Lamps

The energy consumption of small apparatus is usually low compared with the first cost, except with electric kettles, and the reduction in running costs is not usually worth the extra amount incurred in first cost in obtaining higher efficiency. At the present time the main faults in apparatus such as toasters, irons and kettles occur in the connectors and flexes. Records show that about 60 per cent. of the troubles experienced in a hire scheme for kettles and irons have been due to faults of this nature.

There are several ways in which this trouble can be reduced by care on the part of the consumer. A great number of breakdowns in electric irons are due to the consumer winding the flex tightly round the iron when putting the iron away after use.

Consumers have long been taught that it does not pay to buy cheap lamps, but it is not sufficient merely to advise the use of Association lamps. All engineers know, or should know, that the rating of the filament lamp is based upon economic considerations and that this can to some extent be varied by the user according to the price which he pays for electricity.

Take, for example, an undertaking charging a flat rate of 9d. per kWh for lighting, with an alternative two-part tariff of a rateable value standing charge plus ¾d. per kWh. At the higher running charge it would pay the consumer to use a lamp with a voltage rating below that of the supply and so obtain the same light with a lower consumption at the expense of increased cost of lamp replacement. At 9d. per kWh the cost of lamp replacement would be only very small compared with the cost of current. Conversely, with the lower price for electricity, lamps of a voltage rating above that of the supply could be used, giving high current consumption with lower cost for lamp replacements.



Last week an appeal was made for funds for the restoration of Malmesbury Abbey, and the venerable building was floodlighted for the occasion

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Quick-boiling Hot-water Jug

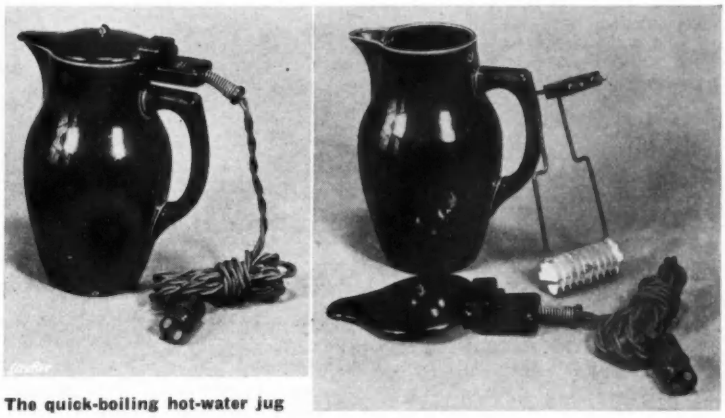
During a recent test of the electric hot-water jug, made by the EXCEL ELECTRICAL EQUIPMENT CO., LTD., Adelaide House, King William Street, London, E.C.4, we boiled two pints of water in five and a half minutes, using a 1,200-W element. In its present form the jug can be used only on a.c. supplies in view of the possible effect of electrolysis if d.c. is used.

The jug is made of Doulton earthenware and its handle, of the same material, is heat insulated. The element, which can be removed quite simply, is coiled around a cylindrical porcelain former and is suspended in the water about one inch above the base of the jug. Half a turn of the element in its centre is made of pure tin instead of nichrome to act as an easily renewable fuse. The two rods which conduct the current from the plug at the top of the jug to the element are spaced about one inch apart and are coated three times with the special insulating varnish introduced recently by Bakelite, Ltd.

The moulded lid which fits over the jug is in one piece with the plug socket; hence the elements can never be connected up until the lid is in position, thus removing the main objection to the use of a directly immersed element. The plug, which is fitted to the top of the jug can be easily removed for cleaning the utensil.

Incidentally, although the type of socket-connector used is that incorporated in electric irons, the plugs are spaced more widely so that only the specially constructed combined socket and lid can be used. Any lime deposited on the element can be dissolved by covering the latter with vinegar. Should the jug be upset the resistance of the thin stream of water that comes out prevents risk of shock. Loadings of 1,200 and 700 W are available in a 2-pt. size in deep blue, but attention is being given to the production of other colours and sizes. The price is 21s.

During tests carried out at Faraday House water was poured into a metal tray whilst the current was on; the spout of the jug being about 3 in. from the tray. The resistance between the spout and either main was found to be about 40,000 ohms. The sole distributors are MESSRS. FALK, STADELMANN & CO., LTD., 83, Farringdon Road, London, E.C.1.



The quick-boiling hot-water jug

Chlorinated Rubber

The new chlorinated rubber known as "Alloprene," lately introduced by IMPERIAL CHEMICAL INDUSTRIES, LTD., Millbank, London, S.W.1, is claimed to be the first solid product of its kind to be manufactured in this country. As at present produced, it is a white, fibrous material containing from 65-66 per cent. of chlorine, and having a composition corresponding approximately to $C_{45}H_{73}Cl_{17}$, both addition and substitution occurring at the same time in the chlorinating process. It is claimed to be remarkably resistant to attack by acids and alkalis at ordinary or higher temperatures; for example, concentrated nitric acid is stated to have practically no effect on "Alloprene" at 80-90 deg. C., and it is unchanged after heating with 40 per cent. caustic soda solution for several hours.

Hydrochloric acid at all concentrations does not attack it at temperatures up to 100 deg. C., and no discoloring results from 98 per cent. sulphuric acid at ordinary temperatures even after several days' contact. The compound is equally resistant to aqueous solutions of oxidising agents such as permanganate, or the hypochlorites and bichromates, and it can also be safely used in contact with such corrosive gases as oxygen, chlorine and sulphur dioxide. Furthermore, in prolonged contact with a naked flame it carbonises without burning or fusing.

The material is soluble in all proportions in a wide range of solvents at ordinary temperatures, forming colloidal solutions. These solvents include cheap hydrocarbons, the non-inflammable chlorinated solvents and a large number of vegetable oils, but it is insoluble in hot or cold water, alcohols or white spirit.

In addition, "Alloprene" solutions possess valuable film-forming properties. Quick drying solutions can be prepared by the use of a suitable solvent, from the evaporation of which films similar to those produced from nitro-cellulose and cellulose acetate are obtainable. The chlorinated rubber is a porous, spongy material of low bulk density (packing density (g/ml)= 0.06–0.16) and is non-hygroscopic. It is suggested as a substitute for such materials as cork, slag-wool, horse-hair, kapok and even asbestos, where these materials are used for thermal insulation purposes.

Three of the Belgrave pottery table standards

Pottery Table Lamps

The pottery type of table lamp appears to be coming into vogue at the moment, and the BELGRAVE ELECTRIC CO., LTD., 24, Belgrave Road, London, S.W.1, has recently introduced a comprehensive range. The three illustrated are typical designs. Both the bowls, which are made of Poole pottery, and the shades are hand painted, and a large variety of colours and designs are available at from 21s. to 55s. wired and complete with shade.

Portable and Inset Fires

The article under the above heading in our issue of August 25th, describing the new Carron fires, stated that type 521 had a fire detachable from the surround. This is incorrect; the floor surround with a detachable fire is known as number 522, and costs £4.

Trough Lighting Units

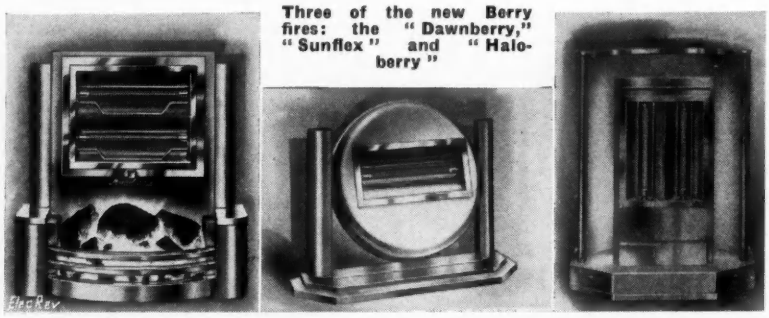
By varying the position of the lampholder along the two rods which carry it the beam of light from the Holophane multi-floodlight trough can be arranged to suit individual conditions. The troughs are made to hold two, three or four lamps, and each has its own prismatic reflector, so that the maximum light flux of each is controlled irrespective of the other units, permitting the use of different sizes of lamps and varying distribution of light.

A Holophane trough lighting unit

The internal metalwork is simply, but robustly, designed

and gives easy access to the wiring. The end plates are cast and assembled with metal rods from end to end, to which are fitted the casting lugs to hold the glassware in position.

The spindles are arranged in the end plates to take simple brackets so that the unit can be clamped in any desired position. The bronze-finished metal cover with a detachable wiring trough, forms the body of the fitting. A watertight gland is provided at one end for wiring. The front has a metal frame with heat-resisting clear glass, although white or colour satin-finished glass can be supplied to give a more extensive distribution.



Three of the new Berry fires: the "Dawnberry," "Sunflex" and "Haloberry"

The prices of the two-, three- and four-lamp troughs are £9 7s. 6d., £11 10s. and £14 10s. respectively. The makers are HOLOPHANE, LTD., Elverton Street, Vincent Square, London, S.W.1.

The "Waltham" Lantern

The "Waltham" floodlantern is the latest development in "Escura" lighting equipment which is manufactured by the EDISON SWAN ELECTRIC CO., LTD., 145, Charing Cross Road, London, W.C.2.

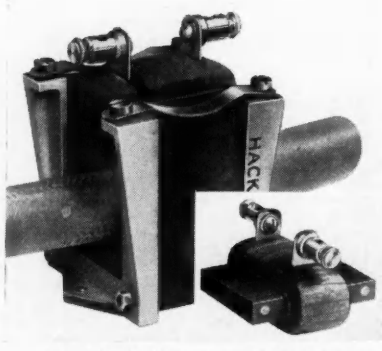
The lantern gives a wide asymmetrical light distribution with a maximum candle power at 50/60 deg. from the vertical. This, together with the prismatic lens which can be fitted in front of the lamp, makes the lantern suitable for applications such as the floodlighting of garages, car parks, road houses, yards, open spaces, &c. It is also quite effective for lighting interiors from side walls.

The "Waltham" lantern for electric discharge lamps

The lantern is supplied complete with an all-porcelain G.E.S. lampholder, and to afford protection to the lamp a heat-resisting clear glass cylinder is provided, together with a bracket mounting support which may be arranged for wall, pole top, or pole clamp fixing. The standard finish is vitreous enamelled white inside and grey outside.

A Handy Current Transformer

A small split-core type current transformer of unusual design, for application to cables *in situ*, has been added to the comprehensive range of instrument transformers manufactured by the HACKBRIDGE ELECTRIC CONSTRUCTION CO., LTD., Walton-on-Thames. Such a transformer is often very handy, enabling current measurements to be made without any interruption of service and providing a light and portable unit which can be slipped on to cables at various points for testing purposes.



The Hackbridge current transformer

The construction of this transformer is clearly indicated in the illustrations. The top section of the yoke is removable, and carries the secondary winding fitted with two large terminals. The cable is slipped into the lower portion of the yoke, thus forming a single turn straight-through primary, and the top section of the yoke is then replaced and clamped down by the phosphor bronze springs provided.

The accuracy of the transformer is suitable for the operation of ammeters, for which work it is primarily intended, the range of primary current being from 150 to 500 A. The dimensions are: height 3 in., width 2¾ in., depth 2¼ in., and the internal dimensions of the yoke are such that cables up to 1⅝ in. diameter can be accommodated.

Some New Berry Fires

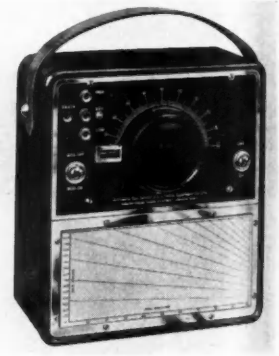
The autumn electric fire programme which has been announced by BERRY'S ELECTRIC, LTD., 85, Newman St., Oxford St., London, W.1, introduces five new fires of which only one, the "Wynberry," is of the non-reflector type. The design of the frame is the same as the "Dawnberry" (illus.) and the ordinary 2-kW elements are in the same position as those of the "Dawnberry," although, in the case of the latter model, there is an adjustment for varying the direction of radiation. Both models have foot-operated switches and are obtainable in oxidised silver or copper finish and polished rustless hobs and front bars. "Magicoal Plus" fuel is incorporated, and the height is 21½ in., width 22 in., and depth 9 in., the price of the "Wynberry" being 4 guineas and that of the "Dawnberry" £4 10s.

The most striking of all the new models is the "Haloberry" which reflects a warm glow from lamps behind the vertical element reflectors. The 1-kW model costs £3 9s. and the 2-kW one £4 9s., with two foot-operated switches and an art silver finish.

The novelty of its design makes the "Sunflex" attract immediate attention. It is made only with a 1-kW element, adjustable for direction of radiation. The finish is oxidised silver or copper and the price is 25s. A similar element but of 2 kW is fitted to the "Rayflecta" (39s. 6d.), which has a rectangular frame with pillars at the side, making an *ensemble* of a pleasing modern design.

The "Avo-Oscillator"

The new "Avo-Oscillator" introduced recently by the AUTOMATIC COIL WINDER & EQUIPMENT CO., LTD., Winder House, Douglas Street, London, S.W.1, provides a steady local signal equivalent to a broadcast tuning note for testing radio receivers and amplifiers.



The "Avo-Oscillator"

The note consists of a modulated h.f. signal, the frequency of which is variable over the whole of the broadcast and intermediate wavebands, three tappings for high, medium, and low bands being provided. Frequencies are quickly determined by comparison between the dial reading and tuning chart provided. The price is £5 10s., and the equipment which is provided includes valves, a 3-V dry cell and a 20-V h.t. battery.

A Neon Electric Clock Sign

Unusual electrical advertising equipment is being manufactured by HELMA PRODUCTS, Dorland House, 14/16, Regent Street, London, S.W.1. It consists of a Smith's synchronous electric clock fitted in a walnut case, a ring of red neon light surrounding the face, and a drum on which six moving messages can be made to appear ninety times per hour. A blue neon light surrounds the message, which rotates sufficiently slowly for every word to be read and yet quickly enough to prevent the reader tiring. The makers suggest that the advertising space can be rented out by the of owner of the clock to cover eventually the original cost of £19 19s., or it can be utilised in the window of an electricity supply undertaking's showroom.

The Helma neon clock and rotating sign

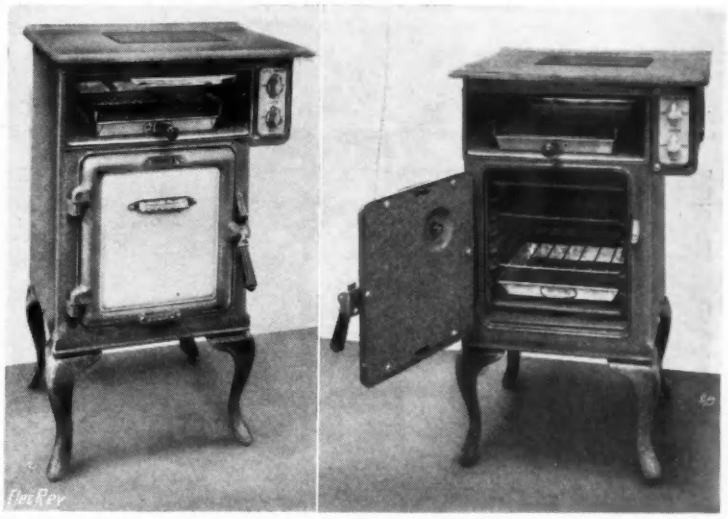
The six cards bearing the messages can be changed in one minute. Model A works directly off 200/240-V a.c., 50 cycles, and is loaded at 60 W, and type B for 200/240 V d.c. is fitted with a battery clock and is supplied with a convertor (£3 15s. extra); in this case the loading is 32 W. The external measurements are 26 in. high by 16 in. by 10 in. and the weight is 25 lb.

A Cooking Campaign

Edmundson's activities over a wide area

SUCCESS beyond the company's expectations was reported to us recently by Commander R. B. Bates, Public Relations Officer to Edmundson's Electricity Corporation, Ltd., concerning the cooking campaign launched lately by that organisation throughout its area of 15,250 sq. miles. In this aggregate area, which is made up of a number of large and small districts in different parts of the country, there is a total population of 4¼ millions, over 500 communities, and about seventy supply undertakings controlled by the Corporation. At present there are about a quarter of a million consumers connected, and it is mainly towards providing cooking facilities to these existing consumers that the campaign is directed. The smaller or artisan type of consumer is aimed at in particular, the Corporation evidently recognising the force of our often voiced conviction that as a whole the smaller consumers can be responsible for many times the consumption of the larger domestic consumers.

In 1933 between 400 and 500 million kWh was generated and purchased by the organisation, and it is hoped that the campaign will be responsible for maintaining the yearly increase in consumption of 20 per cent. which has been attained during the last few years, in spite of the depression, by the increase in the use of domestic appliances. Of course, although the intensive campaign proper has been in operation for only a few weeks, much spade work, mainly in establishing suitable tariffs, has been going on for some years, and the Corporation can certainly now approach most of its consumers with an economic proposition for cooking by electricity.



Exterior and interior views of the Edmundson cooker

One of the company's publicity folders

The present maximum tariff within the areas is 1.5d. per kWh, and the scales available in the Wessex urban and rural districts may be taken as typical. In these districts electricity is available for heating and cooking at a flat rate of 1.5d. per kWh and also at a domestic rate embracing a kWh charge of 1.25d. per kWh and a service charge based on floor area ranging upwards from 47s. 6d. per year for a dwelling house with a floor area not exceeding 700 sq. ft.

An example of some of the more favourable rates is that in the Halesowen district of the Shropshire, Worcestershire and Staffordshire Electric Power Company, where 1d. per kWh is charged for the first 125 kWh consumed and 0.625d. per kWh for all additional kWh consumed per quarter. The two main features of the campaign are intensive publicity and the issue of a specially constructed standard cooker at favourable outright purchase, easy-payment and hiring rates, according to requirements.

The first move in the publicity work is the dispatch to every consumer in a community of a copy of a specially prepared and illustrated leaflet "Cook in Comfort and Cleanliness." In this a brief pen picture contrasts the clean, easy and efficient electric cooking of to-day with the older methods involving wood chopping, fuel carrying and hearth cleaning of yesterday, while, in addition to some general particulars of the standard cooker and information as to how it can be acquired on any of the alternative systems, the consumer is told how to obtain first-hand information about any other cooking equipment of his choice, cooking tariffs and cooking demonstrations.

The leaflet publicity is supported by considerable local Press advertising and personal canvassing by the local staffs. Further, the demonstrators attached to all the showrooms give "shows" at weekly or less frequent intervals, according to the size of the place, for which special invitations are sent out, while in the remote areas similar work is done by means of the Corporation's demonstration caravans and mobile exhibitions.

Support of the campaign is, of course, also given in the Corporation's quarterly magazine "Electric Service," which is also sent to every consumer. Edmundson's are about to issue a loose-leaf recipe book complete initially with one week's menus and recipes. In each future issue of "Electric Service" there will be an insert with a day's menus and recipes which the consumer can add to his loose-leaf book.

Considerations which led to the particular design of the cooker adopted were reasonable capital cost, economic maintenance, good performance and good appearance. Regarding cost it was decided to eliminate any part not absolutely essential for cooking operations, for instance, the hot-cupboard door. Deliberations on maintenance led to the policy of regarding the cooker body not as a piece of electrical equipment but as a lagged box to and about which electrical equipment could be fitted and replaced, with plug-in elements throughout and the oven elements interchangeable.

The Corporation insisted on a luminous boiling plate, and it was with much interest that we listened to the comments of Mr. L. Howles (general man-

A cooking demonstration caravan in an old-world setting

ager S.W. & S. Co.), on the importance of letting the consumer see the hot-plate operating. On the gas and coal fire, he said, the kettle starts to make a noise almost as soon as it is put on, and the people have thus always been used to "seeing" and "hearing" the operation. The luminous plate overcomes one of these difficulties at any rate. Great importance is attached to maintenance because of the cost of servicing consumers remote from the depots—in many cases 20 miles or so away—and in designing the cooker an eye was kept on the possibility of avoiding two servicing journeys.

With the new equipment a girl demonstrator can be sent out in response to a request with one oven element and one boiling unit. Fifty per cent. of the requests are the results of ignorance or carelessness on the part of the consumer and merely require a little educational work. The girl can do this. Most of the other cases require an element renewal, and the demonstrator can do this on site in a few minutes. Very occasionally there is switch trouble and the girl is sufficiently trained to recognise this, but a second journey is necessary.

The "Utilo" cooker, which is made specially for the organisation, measures 22¼ in. wide, 19½ in. deep, and 35¼ in. high, and has a 2,000-W grill-boiling plate, and an oven with a cooking space of 11½ in. loaded at 1,800 W. The hob unit is of the semi-open type with inverted channel protection, resulting in an upward reflection with the deflector plate in position.

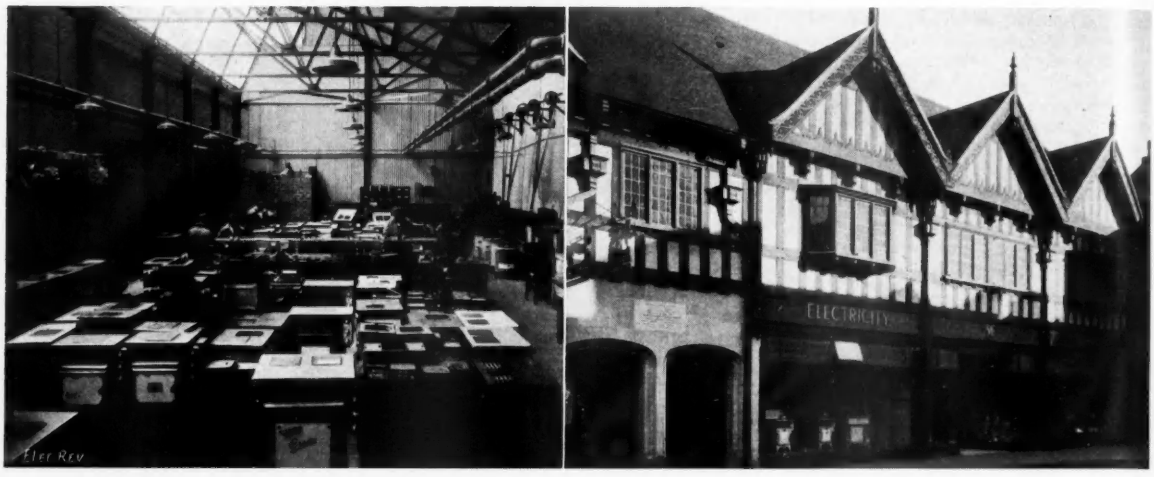
A test run on one of these cookers provided food for a whole day for a family of six for a total consumption of 4.15 kWh. For breakfast grilled bacon and mushrooms and tea were prepared in twelve minutes. For lunch twelve rock cakes, a sponge sandwich, 3¼ lb. of lamb, a pie with 2 lb. of plums, ¾ pint of gravy, 3 lb. of potatoes, 3 lb. of peas, 1 lb. of plums (stewed), and one pint of custard, were all cooked in 2¼ hours, the cakes and pastry being dealt with before the meat was inserted. For tea three pints of water were boiled in ten minutes, and for supper coffee and grilled tomatoes on toast were made in a similar time. In this test special utensils were deliberately avoided.

But the acid test for economical electric cooking is the extent to which it is employed by the poorer classes of consumer, and it is worth recording that in the Evesham agricultural district, where incomes are little more than £2 per week per household and the housewife helps on the land, one in every five of the domestic consumers cooks by electricity.

The "Utilo" cooker is offered on outright purchase at £7 18s., on easy payments for 17s. 6d. down, and twenty quarterly payments of 9s., or by simple hire through a prepayment meter for an additional farthing per kWh consumed. In all cases the wiring is supplied free.

The company is now installing cookers at the rate of about 150 per week, and experience suggests that this will be a constant figure for some time to come. New consumers are being connected at the rate of 3,000 or 4,000 per month.

The scheme for the intensive development of the cooking load was conceived by Mr. J. T. H. Legge, the general manager of the company, and is being carried out under his personal supervision.



Left: One of the group's domestic appliance service departments. Right: A district office and showroom

French Electrical Manufacture

A GLOOMY picture of the French electrical manufacturing industry was drawn at the recent general meeting of the Syndicat Général de la Construction électrique by M. Davezac. No sign of improvement, he said, had been visible in the industry during a period when various other branches of activity had shown more or less appreciable indications of recovery. The market for heavy material, which between 1930 and 1932 had fluctuated around about 73 per cent. of capacity, had in 1933 become stable at its lowest level.

While it was true that there had been increased business in e.h.p. apparatus, orders for large transformers had been no more numerous and a fresh decline had taken place in contracts for turbines and large machines. On the whole, the output of the important works was in 1933 lower by 72 per cent. than in 1930. The only branches of electrical manufacture which had escaped the slump were a small number of factories engaged mainly in new applications, notably labour-saving devices for the home.

M. Davezac attributed the depression of the electrical trade chiefly to the lack of home orders, but added that the state of the export markets had accentuated it. French exports of electrical material which in 1932 amounted to 93,000 quintals valued at 142 million francs fell last year to 85,000 quintals valued at 105 million francs. The fact that the fall in tonnage was only 8 per cent. while that in value was 26 per cent. indicated that great sacrifices in price were necessary in order to meet foreign competition.

Compared with 1931 the decline in exports last year in tonnage was 52 per cent. and in value 62 per cent. It was not spread evenly over all markets, the drop in value being 25 per cent. for Italy, 27 per cent. for Belgium (which remains the best foreign customer of the French electrical industry), 29 per cent. for Great Britain, 33 per cent. for Spain and 78 per cent. for Poland. On the other hand, sales to the French colonies showed remarkable stability and amounted last year to 124,000 quintals valued at 151 million francs as compared with 121,000 quintals valued at 153 million francs in 1932.

While thus reviewing conditions in the French electrical manufacturing industry, M. Davezac also gave a brief survey of the state of the competing industries in Germany and the United States. In Germany, he said, according to the results announced by the principal companies, there had been a general decline in activity of 20 per cent., while on the export side, which is of great importance to the German firms, the drop in tonnage had been 24 per cent. and that in value 30 per cent. in 1933 compared with the previous year. During the opening months of the current year, however, a sharp revival in the home market had brought about a noteworthy revival.

In the United States, M. Davezac pointed out, the orders booked by the two leading electrical manufacturing concerns rose by 12 per cent. in 1933, while exports showed an appreciable growth on those of the preceding year.

He proceeded to contrast these moderately favourable results with the poor returns obtained in the French electrical manufacturing world. Statistics relating to twenty different companies representing various departments of French electrical manufacture—machinery, apparatus, cables, accumulators, meters, telephones and insulators—the share capital of which totalled 1,500 million francs, revealed that they had been able to pay less than 2 per cent. Reductions in staff and salaries had been necessary and while the daily wage rate of the workpeople had not as a general rule been reduced their earnings had been materially curtailed because of short-time working. Meanwhile, the remuneration of the technical and administrative staff had been cut on the average by 10 per cent. and by 20 per cent. for the upper grades.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures

Electrical Activity

The B.E.A.M.A. Index of Activity gives a figure of 81.0 for July (1924=100) as compared with 73.6 for June and 65.2 for July, 1933. The number of insured workers unemployed was only about half of the number recorded in July last year. The output of authorised electricity undertakings in July represented 2.05 per cent. of the corresponding 1924 output; in July, 1933, it was 180 per cent.

Recent Contract

The English Steel Corporation, Ltd., has received an order from International Combustion, Ltd., for boiler drums, &c., required in connection with the extensions to the Hams Hall power station, Birmingham, the North Wilford station, Nottingham, and the generating station at Leicester. The value of the order is over £60,000, and the *Times* states that in all there will be thirty-nine boiler drums, steam receivers, &c., ranging from 14 ft. to 38 ft. in length and two tons to forty-one tons finished weight, for which ingots up to 120 tons in weight will be required.

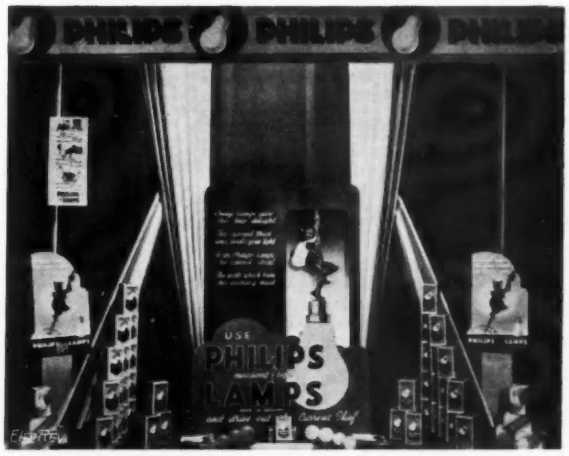
The New Zealand Customs Tariff

The *Board of Trade Journal* reports that the following items have been reinstated in the New Zealand Customs tariff:—"338 (4) Electrical appliances peculiar to electro-plating, electro-chemistry, electro-metallurgy, surgery, telegraphy, telephony, including wireless broadcast receiving sets not mounted in cabinets but not including cabinets or parts of cabinets for such sets; X-ray tubes and electrical vacuum tubes not suitable for purposes of illumination—free (British preferential tariff); 25 per cent. *ad valorem* (general tariff); (9) wireless broadcast receiving sets, mounted in cabinets—10 per cent. *ad valorem* (free after June 1st, 1935) (British preferential tariff); 35 per cent. *ad valorem* (general tariff)."

New rates of duty have been imposed upon other articles including the following, the old rates being shown in parentheses:—Chassis for electrically propelled motor vehicles of approved types: British preferential, free (7½ or 15 per cent. *ad valorem*); general, 20 per cent. (52½ or 60 per cent). Batteries and cells, other than storage batteries: British preferential, 15 per cent. (free); general, 40 per cent. (25 per cent.).

The Philips Autumn Lamp Campaign

In our last issue we referred to the lamp publicity matter which Philips Lamps, Ltd., has prepared for the forthcoming season. We have now received further material from the company relating to this campaign. Some arresting window displays, showcards and cut-outs are available for retailers. The "Current Thief" baffled by Philips lamps is the central figure in most of them; but there is also an effective design showing a large "Argenta" lamp above a brilliantly illuminated house. The company has issued a forceful piece of direct mail to the



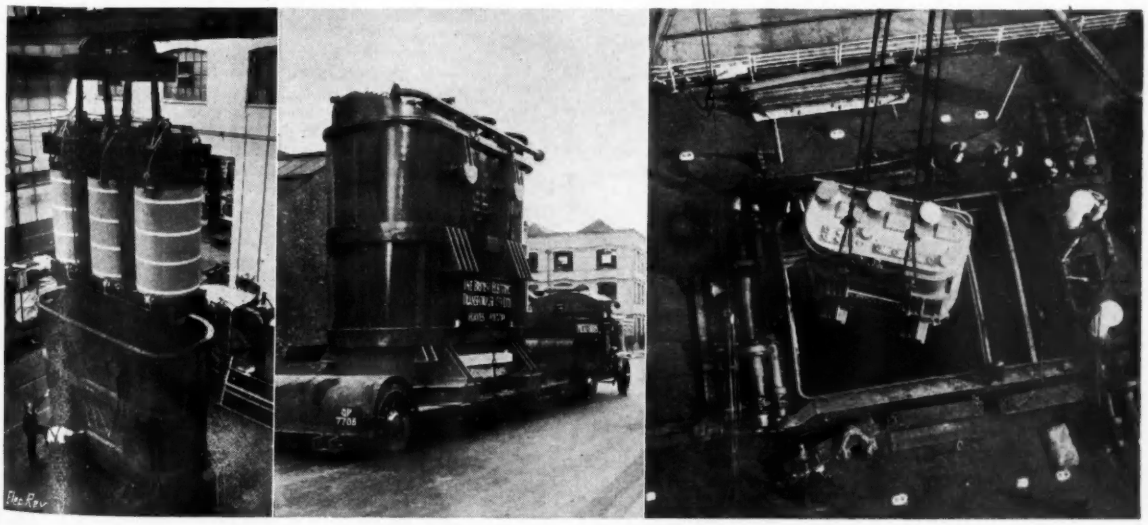
A Philips lamp campaign window display

A Large Transformer for Australia

A 37,500-kVA transformer, one of the largest ever shipped to Australia, has just been built by the British Electric Transformer Co., Ltd., to the order of the State Electricity Commission of Victoria. It was taken by road last week from the B.E.T. Co.'s works at Hayes, Middlesex, to the London docks, the journey occupying a day and a half. From Victoria Dock the unit, which weighed 66 tons as shipped, without oil, was transferred by the Port of London Authority's "mammoth" floating crane to the King George V Dock, and there lowered into the hold of the s.s. *Port Denison*.

The equivalent double-wound kVA of the transformer is 49,250. Cooling is by forced oil circulation with an external water cooler. The transformer is designed to work in parallel with existing units having the same kVA and voltage ratios. The 11-kV windings supply a synchronous condenser which will give a power factor approximating to unity on the 120-kV supply. The h.v. bushings are oil-filled and are fitted with bushing current transformers, the m.v. and l.v. bushings being of the standard porcelain clad type.

The equipment for indicating the temperature of the windings involves the use of embedded elements wound into the m.v. winding and brought outside the tank, *via* an insulating transformer, to an existing instrument on a panel situated in the power station. The total weight of the unit, with oil, is 84 tons, the transformer itself weighing 50 tons and the tank and accessories 16 tons.



A B.E.T. transformer being shipped to Australia

The transformer is of the three-limb core type, triple wound, and is designed for outdoor service on three-phase, 50 cycle supply as follows:—

	High Voltage.	Medium Voltage.	Low Voltage.
kVA	31,000	37,500	30,000
Ratio	120,000	22,000	11,200

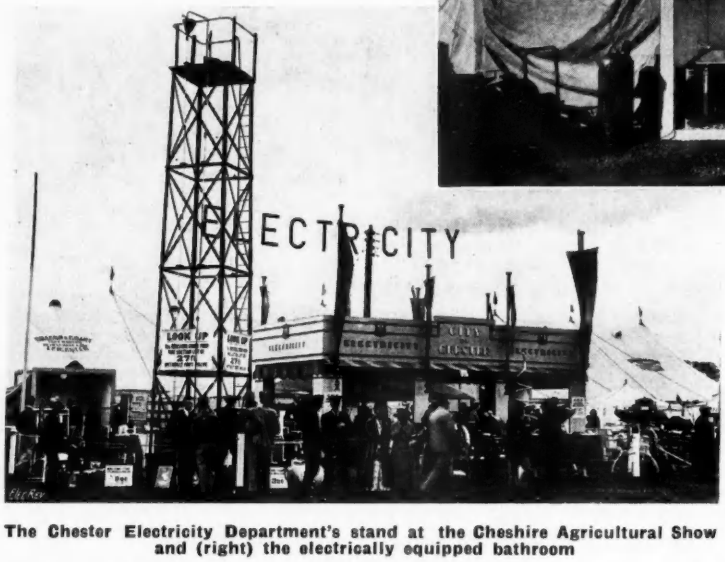
trade on the subject of the "coiled coil" lamp; the letter is headed by an illustration of the coiled-coil filament, an ordinary spiral coil filament, and a human hair, as seen under a magnifying glass thirty-five times enlarged.

Warsaw Railway Electrification

Representatives of the contractors' committee for the electrification of Polish railways are now staying in Warsaw, states a *Reuter's Trade Service* message from that city. This committee was instituted by two British groups who concluded an agreement with the Polish Government for railway electrification in Poland. The experts, by arrangement with the engineers of the Polish Ministry of Communications, are examining in their turn the technical conditions for the construction of an electric traction system. According to the agreement with the British firms, the latter will give orders to Polish works for certain material such as poles, cables, &c.

The Cheshire Agricultural Show

The Cheshire Agricultural Show was held on the Roodee, Chester, on August 30th. The entries were a record and the attendance the largest for some years. The Chester Corporation Electricity Department had an extensive stand covering an area of 90 ft. by 70 ft., and displayed a large variety of electrical apparatus for use on the farm and in the homestead, including sterilisers, geared portable motors, electric incubators, cream separators, a corn mill, chaff cutter, grinder and cleaner driven from a countershaft, refrigerators, bottle washers, milking sets, brooders,



The Chester Electricity Department's stand at the Cheshire Agricultural Show and (right) the electrically equipped bathroom

portable electric drills, and poultry plucking, clipping and sheep shearing machines. At one end of the stand an electric kitchen was demonstrated and fitted up with a washing machine and wash-boiler, cooker, water heater, refrigerator, &c., and at the other end an electrically equipped bathroom comprising a water heater, electric fire, towel rail and shaving mirror. In addition to the foregoing the Electricity Department showed a number of cookers, wash-boilers, washing machines, fires, irons, vacuum cleaners and other domestic appliances. Exhibitors of agricultural implements also used electricity for demonstration purposes.

The Norwegian Electrical Industry

In his report to the Department of Overseas Trade on the economic conditions in Norway, dated May, 1934 (Stationery Office, 2s. 6d. net), Mr. C. L. Paus, Commercial Secretary to H.M. Legation, Oslo, states that for Norway, as for the rest of the world, the past two years have bristled with economic complications. She seems, however, to have fared better than many other countries. In spite of falling prices and rising trade barriers the volume of Norwegian exports attained in 1932 the level of 1930 and increased somewhat in 1933, when it was little below the record established in 1929. In the case of imports there was a heavy fall in 1932 followed by a slight recovery in 1933. Under the Anglo-Norwegian Commercial Agreement which came into force in July, 1933, Norway secured free entry into the United Kingdom for a number of articles, including electro-thermic and electro-metallurgical products. Dealing with the engineering industries, Mr. Paus states that electrical workshops and manufacturers in Norway have lacked occupation owing to the absence of enterprise in the harnessing of water power, but they have taken the opportunity to modernise their plants in anticipation of better times. Among the new commodities of which the manufacture has been, or will shortly be, commenced are drawn-wire electric lamps. Plans have been drawn up for the early electrification of the following sections of railway:—Kongsberg-Hjukesbø, Notodden-Borgestad, and Oslo-Ski. No actual decision has yet been made with regard to the execution of these works, but it is assumed that kr. 4,000,000 of the funds recently placed at the disposal of the Government for alleviation of the existing crisis will be applied to railway electrification. The imports of electrical apparatus during 1932 and 1933 were as follows:—

	1932. Kr.	1933. Kr.
Electrical machinery and apparatus	17,831,887	16,937,377
Electricity meters	457,144	633,157
Other technical measuring and control apparatus ...	1,033,770	1,032,069

The figures below show the exports (in kg.) of electrical apparatus, &c., exported during the years 1932 and 1933.

	1932. Kg.	1933. Kg.
Electric motors	162	1,980
Telephone and telegraph apparatus	32,594	4,340
Cables, insulated and bare	294,016	504,707

The Timber Market

After heavy receipts of Canadian and European building and joinery woods to the end of July this year, imports have tapered off within recent weeks. Consumption, on the other hand, has been keeping well up. Prices on the spot have firmed up a little, but not yet to the level of those for fresh purchases plus costs of transport, and United Kingdom importers are not buying much from abroad until stocks here have diminished further. The hardwoods have been in fairly good demand compared with August of previous years. Larger arrivals and spot consumptive demand have been forthcoming for British Empire mahogany and teak, and the Canadian hardwoods also have been in good request. There does not, however, appear to be such a large call for foreign oak. The demand for plywood continues brisk.

Polish Electrical Production

According to statistics published in Warsaw, the total value of electrical manufactures produced in Poland in the first half of this year amounted to 30,000,000 zlotys. The first place is occupied by lamps at 3,974,000 zl., electrical machines represent 2,236,000 zl., accumulators and parts 2,125,000 zl., and telephone apparatus 1,058,000 zl.

A Fire Brigade's Success

The Willesden Fire Brigade of the B.T.H. Co., a photograph of which appeared in our issue of August 3rd, had a successful day at the National Fire Brigades Association (South Midland District) contests on August 25th, when, in competition with about twenty other brigades, they won the following awards: Motor turnout, first prize; motor pump wet drill (Division 2), first prize; motor pump wet (B) drill (Division 1), second prize. In addition, they were awarded the District Challenge Shield with a score of 295 points out of a possible 300, and the Grand Aggregate Challenge Shield with a score of 395 points out of a possible 400.

Smoke Detection

At the Annual Conference of the Sanitary Inspectors' Association held at Southport from September 3rd-7th the General Electric Co., Ltd., gave demonstrations of smoke detection equipment employing the "Osram" photo cell.

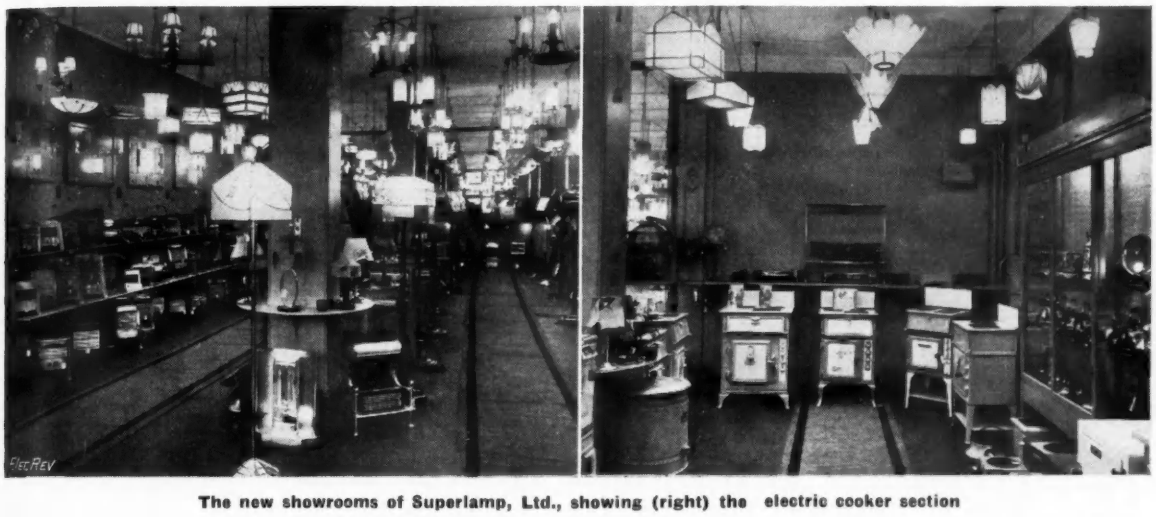
Social Events

The annual sports and gala day of the Enfield Cable Works Social and Athletic Club was held on the Club's sports ground at Brimsdown, Middlesex, on September 1st before a good attendance of the members, their families and friends. Under ideal weather conditions a full programme of events was carried out, and many keen finishes were witnessed. Outstanding performances included the following: Mr. H. Hadfield (office staff) won the 100 yds. handicap; Miss Walpole (Cable Dept.) won the 80 yds. handicap (ladies); Mr. A. J. Tilling won the mile walk; the Stranding Dept. beat the Rolling Mills Cost Office in the tug-of-war; and the Test Dept. was successful in both the 440 yds. and mile relay races. At the conclusion of the sports the prize distribution was presided over by Dr.

E. Bowden (chairman of the Club), supported by members of the Entertainments Committee and official guests, including representatives of the Cosmos Social and Sports Club. Mrs. Bowden distributed the prizes to the winners, and Dr. Bowden, responding to the vote of thanks to Mrs. Bowden, took the opportunity of invoking the sustained interest of the members in the social side of the Club, and moved a vote of thanks to the officials responsible for all the arrangements for the day. A dance followed in the Club Hall to music provided by the "Cabromil" Orchestra, composed of Club members.

A London Wholesalers Showrooms

Superlamp, Ltd., has recently moved into new premises at 6, Paul Street, Finsbury Square, E.C., and the increased accommodation has given the company the opportunity of providing a most up-to-date and well-equipped wholesalers' showroom for the use of electrical contractors. The showroom, which is on the ground floor, is of sufficient dimensions to allow the electrical apparatus to be shown to advantage, and the various appliances are so assembled that the prospective customer can see the various designs of each class together. Thus there are sections for water heating, lighting fittings, cookers, electric fires, vacuum cleaners, radio sets, &c. In addition to the lighting fittings suspended from the ceiling, bowl fittings of various designs are placed on shelves, which are wired for lighting, so that the effect of the various designs can be compared when illuminated. Another interesting feature of this section is that a false ceiling has been constructed at the height of an average bathroom so that a true impression of the effect of the fittings for this type of room is obtained. The premises have four storeys, the remaining accommodation being set apart for the staff and for stores. The company is opening a branch at Southend-on-Sea, which will bring the number of branches up to twelve. Our pictures show a general view of the showrooms and the electric cooker section.



The new showrooms of Superlamp, Ltd., showing (right) the electric cooker section

Prices of Materials

Messrs. F. Smith & Co. report, September 5th: No change in the price of electrolytic copper bars, wire rods and h.c. wire and silicium bronze wire.

Messrs. James & Shakespeare report, September 5th: No change in the price of copper bars (best selected), sheet and rod, and English pig lead. Electrolytic copper sheets, £31 to £31 10s., 5s. decrease.

Messrs. Edward Till & Co. report, September 5th: India-rubber, Para fine, 5½d., ½d. decrease.

Coalectric Demonstration Home, Torquay

The Coalectric Demonstration Home which is being exhibited in Florida Road, Torquay, until October 31st, and which was officially opened to the public by Sir William Ray, M.P., Executive Chairman of the British Electrical Development Association, on September 3rd, was organised by the Torquay members of the Torquay and District E.D.A. Circle. The Coalectric House is the first exhibit of this character to be organised in the Torquay district. It represents a type of house which is being erected in large numbers all over the country. The house is completely equipped with electric labour-saving appliances and services, while retaining one grate which, by the removal of the electric fire from the alcove, may be used for a coal fire if desired. The Torquay Corporation Electricity Department has a favourable two-part domestic tariff and hiring schemes.

Trade Announcements

The Provincial Incandescent Fittings Co., Ltd., has removed to more commodious premises at Shudehill, an arterial road in the centre of Manchester. Pifco House stands on a prominent corner site abutting the streets of Shudehill and Watling Street. It has five storeys and a basement, with three lifts. A showroom has been fitted out on the ground floor in Shudehill, and a trade counter in the Watling Street section. Office accommodation has been taken up on the top floor. It is hoped within a few weeks to be in a position to execute orders more promptly.

The Bristol branch of the Foster Engineering Co. has been removed to 48, Victoria Street. Besides containing more space for stockrooms the new premises include a showroom.

Messrs. George H. Scholes & Co., Ltd., have removed their offices and works to Wythenshawe, Manchester.

Messrs. Greene, Phillips & Co. have removed their showrooms to First Avenue House, High Holborn, W.C.

Catalogues Required

The Whitaker Electric Co., Ltd., wholesale electrical and radio distributors, 24, Percy Street, W.1, ask for manufacturers' lists.

New Catalogues and Lists

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, E.C.—The 1934-35 catalogue of electric lamps with particulars of the "coiled-coil" lamp.

English Electric Co., Ltd., Stafford.—Catalogue of electric fires for the coming season.

The Sun Electrical Co., Ltd., 118 and 120, Charing Cross Road.—The 1935 catalogue of radio receivers and radiograms, giving technical details and illustrations. Also a leaflet containing a schedule of radio manufacturers' hire-purchase terms.

Wholesale Fittings Co., Ltd., 23-37, Commercial Street, London, E.1.—A new "Supastone" catalogue.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, London.—1934-35 valve guide.

Gent & Co., Ltd., Faraday Works, Leicester.—A catalogue of the "Pul-syn-etic" system of electric clocks.

Radio Instruments, Ltd., Purley Way, Purley.—A list of radio sets and instruments.

Metropolitan-Vickers Electrical Co., Ltd., Bush House (West Wing), Aldwych, W.C.—An illustrated catalogue of "Cosmos" lamps including details of the new coiled-coil filament construction.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.—A catalogue containing illustrated particulars of "Osram," Robertson and "Osglim" lamps, including "coiled coil" lamps.

The Hotpoint Electric Appliance Co., Ltd., 24, Newman Street, W.—An illustrated and priced list of "Hotpoint" electric fires.

P.I.F. Co., Ltd., Shudehill, Manchester.—A folder relating to "Pifco" rotameters and "all-in-one" radiometers.

The Abbey Electrical Co., Ltd., 53 and 54, Haymarket, S.W.—A pamphlet relating to brass bayonet-cap and cord-grip lampholder flashers, bakelite-adaptor and other flashers.

Premier Electric Heaters, Ltd., Keeley Street and St. Andrew's Road, Birmingham.—A leaflet giving illustrated particulars of "Premier" inset fires.

Whitworth Electric Lamp Co., Ltd., 6/10, Gorleston Street, West Kensington, W.—A 1934-35 price list of electrical accessories.

Pope's Electric Lamp Co., Ltd. 5, Arthur Street, New Oxford Street, W.C.—A folder giving prices of "Elasta" "coiled-coil" and other lamps.

Bankruptcy Proceedings

F. S. S. Wates, wireless set manufacturer and salesman, 53, Lancaster Gate, W.2.—Receiving order made August 23rd on a creditor's petition. Public examination, November 13th, at Bankruptcy Buildings, Carey Street, W.C.

B. S. Jones (North Wales Battery Service), radio dealer, Buxton House, Barmouth.—Receiving order made August 22nd, on debtor's own petition.

H. C. Vanson, electrical engineer, 35, Pasture Road, Goole.—Public examination, October 11th, at the Court House, Wakefield.

D. Tweedle, radio and electrical engineer, 42, Market Street, Milnsbridge, Huddersfield.—Last day for receiving proofs for dividend, September 12th. Trustee, Mr. J. A. Morris, 71, Manningham Lane, Bradford, Official Receiver.

C. E. Keates, electrical and mechanical engineer, 110, Brent Street, Hendon, N.W.—Receiving order made August 29th on a creditor's petition. First meeting, September 12th, and public examination November 29th, both at Bankruptcy Buildings, Carey Street, W.C.

J. Watkins, radio dealer, 25, Bailey Street, Brynmawr.—First meeting, September 7th, at 34, Park Place, Cardiff. Public examination, October 25th, at the Town Hall, Tredegar.

E. Blackmore, electrician, 33, Monmouth Road, Dorchester.—Trustee, Mr. H. T. Jones, 12, Rolleston Street, Salisbury, Official Receiver, released August 15th.

B. Hetherington, wireless dealer, Westgate, Elland.—Trustee, Mr. J. O. Morris, 71, Manningham Lane, Bradford, Official Receiver, released August 10th.

B. Roberts (Auto Electrical Co.), electrical engineer, Tymawr Street, Aberavon, Port Talbot.—Trustee, Mr. A. J. Rogers, Government Buildings, St. Mary's Street, Swansea, Official Receiver, released August 16th.

E. M. Barker and **H. D. Stillwell** ("Berks Electrical Co."), electrical and wireless engineers, 14, Cross Street, Reading.—Trustee, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., released July 20th.

J. K. Gardner, electrical engineer, 52, Bell Street, Henley-on-Thames, and 12, High Street, Cinderford, Glos.—Trustee, Mr. J. B. Simmons, 8, Forbury, Reading, Official Receiver, released June 29th.

L. E. Pearce ("St. John's Electrical Co."), electrical engineer, 48, St. John's Road, Tunbridge Wells.—Last day for receiving proofs for dividend, September 14th. Trustee, Mr. A. E. Orbell, 6 and 7, Old Steine, Brighton.

S. M. Shackleton, wireless engineer, 14, Colliergate, York.—First and final dividend of 6d. in the £, payable September 13th, at 17, High Ousegate, York.

Company Liquidations

Dick's Wireless & Electrical Factors, Ltd., 238, High Road, Kilburn, N.W.—Under the compulsory liquidation of this company the creditors and shareholders met on August 28th at the Board of Trade Offices, Carey Street, W.C., before Mr. G. W. Hutcheson, Assistant Official Receiver. The company was formed in May, 1932, to acquire and carry on the business of a wholesale and retail dealer in wireless and electrical goods, then being carried on by Frank Louis Dicks as "Grange Radio." The issued capital was £200 and the consideration for the transfer of the business was an undertaking to pay existing liabilities amounting to £1,323. Dicks had established the business in 1930 and conducted it by means of travellers calling on wholesale dealers throughout the country, a small retail trade being also carried on at Kilburn. In April, 1934, £500 was borrowed on the security of debentures, and on July 6th Mr. H. B. Sacks was appointed receiver for the debenture-holder. No statement of affairs was lodged, but the liabilities were roughly estimated at £2,500 and the assets at £1,200, but the receiver is of opinion that the realisation will only yield a small surplus after payment of the debentures. The failure of the company is attributed to heavy overhead expenses, depression in the wireless trade, and bad debts. A resolution was passed for Mr. W. A. J. Osborne to act as liquidator with a committee of inspection.

A. W. H. Sound Reproducing Co., Ltd., King's Road, St. Pancras, N.W.1.—A meeting of creditors was held recently when a statement of affairs was submitted showing liabilities of £3,186 and net assets of £830, leaving an estimated deficiency of £2,356. It was stated that the first directors of the company were Messrs. A. W. Harris and J. C. Jefferies, and the object of the company was to take over the business previously carried on by Mr. Harris under the name of the A. W. H. Sound Reproducing Co. In December, 1931, a debenture of £5,550 was issued for cash to Karflex, Ltd. In 1933 the original debenture was fully satisfied and a further debenture for £2,200 was issued, £200 being in respect of premium. The present position had been brought about owing to the fact that several orders could not be completed during August, and the company approached the debenture holders for a further advance of £500, but this the debenture holders declined to make without investigating the company's affairs. It was stated that a receiver had been appointed and resolutions were passed for the appointment of Mr. C. Latham, of 78, New Oxford Street, W., as liquidator, together with a committee of inspection consisting of representatives of the General Electric Co., Ltd., the Edison Swan Electric Co., Ltd., and Mr. A. W. Harris.

Sovereign Products, Ltd., 57, James Street, Camden Town, N.W.1, wireless and electrical manufacturers.—The statutory meeting of creditors was held on August 30th in London, when Mr. Rooke, one of the directors of the company, presided and said that the shareholders had previously passed a resolution nominating Mr. Jacobs, of Messrs. Chipchase, Wood & Jacobs, Newman Street, London, W., as liquidator of the company. Mr. Jacobs was also the receiver for the debenture holders. A statement of affairs was submitted which disclosed liabilities of £2,831, of which £1,059 was due to the trade, and Mr. Rooke was a cash creditor for £1,772. The net assets were £610, leaving a deficiency of £2,221. Mr. Jacobs reported that the company was incorporated in July, 1930, with a capital of £1,000 and the trading was successful until June, 1932. During 1932 to 1933 a loss of £2,138 on trading was incurred, and from July, 1933, down to the date of liquidation there was a further loss of £4,300. In order to try and improve business the company decided to commence manufacturing electric lamps and other commodities but that venture did not meet with the success anticipated. A resolution was passed confirming the appointment of Mr. Jacobs as liquidator of the company, and Mr. Rooke, the cash creditor for £1,771, said it was his intention to withdraw his claim from the estate in respect of any dividend which might accrue to the unsecured trade creditors.

City Electrical Appliances, Ltd.—Meeting, October 9th, at 14-16, Corridor Chambers, Market Place, Leicester, to receive an account of the winding-up by the liquidator, Mr. O. N. Holmes.

Rectifiers, Ltd.—Meeting, October 1st, at Allen House, Newarke Street, Leicester, to receive an account of the winding-up by the liquidator, Mr. G. R. Eaton.

Dissolution of Partnership

The Grove Electrical Co., electrical engineers, 27 and 201, Grove Lane, Handsworth, Birmingham.—Messrs. A. C. Gibbons and A. Danks have dissolved partnership. Mr. Danks will attend to debts and carry on the business at 27, Grove Lane, Handsworth, Birmingham.

Electricity Supply

Lighting, Domestic, Power

Aberdare.—ILLUMINATIONS.—In connection with the Hospital Week, which was to start yesterday (Thursday), a special scheme of illuminations costing £600 has been installed at Aberdare Park.

Appleby (Westmorland).—TOWN HALL LIGHTING.—The Town Hall is being lighted and heated by electricity instead of gas.

Arbroath.—RAIN CAUSES BREAKDOWN.—Torrential rain during the day is thought to have been the primary cause of a fault in an electricity main which recently caused a breakdown in the supply service throughout the town.

Australia.—VICTORIA.—The Minister for Public Works informed the Victoria Legislative Council that the State Electricity Commission had not yet determined its future developmental policy created by the State Electricity Commission (Trading) Act, 1933. The total sales made by the Commission from January 1st, to March 31st, 1934, were £31,508, compared with £18,604 for the corresponding period of 1933.

Benfleet.—SUPPLY TO NEW HOUSES.—The Urban District Council has consented to the Southend-on-Sea Corporation supplying electricity to houses at Highlands, Hadleigh, erected by the Leslie Estates Co.

Billericay.—OVERHEAD LINES.—The County of London Electric Supply Co., Ltd., proposes to erect overhead lines in the area.

Bisley.—STREET-LIGHTING POLL.—To decide whether electric lighting shall be installed in the village streets, a poll has been arranged for to-morrow (Saturday).

Bolton.—MARKET HALL ILLUMINATION.—The Markets Committee has approved a scheme for the electrical illumination of the Market Hall, Knowsley Street, and other improvements at a cost of £15,000.

Bozeat (Northants).—PUBLIC LIGHTING.—Northampton Electricity Supply Co. announces large reductions in the cost of street lighting to Bozeat Parish Council from September 22nd.

Brazil.—HYDRO-ELECTRIC CONCESSIONS.—Recent enactments by the Government provide that the authorities of the various States and municipalities may grant concessions for hydro-electric power developments to Brazilians or to companies in which 60 per cent. of the capital is owned by Brazilians.

Bredbury and Romiley.—SUPPLY SCHEME.—The Urban District Council has approved a scheme submitted by the electrical engineer for a supply of electricity to the Highfield Park Estate at an estimated cost of £4,696.

Caton.—STREET LIGHTING.—The Ministry of Health has sanctioned the sale of securities held by the Parish Council to enable the Council to finance a street lighting scheme. Thirty-seven lamps are to be erected.

Chelmsford.—ACQUISITION OF UNDERTAKING.—The Electricity Commissioners have granted permission to the County of London Electric Supply Co. to acquire the local electricity undertaking of the Electric Supply Corporation. This does not affect the Town Council's right to purchase.

Clitheroe.—ANNUAL REPORT.—At March 31st last the Electricity Department supplied 2,261 consumers, an increase of 361 over a year before. In his annual report the electrical engineer also reveals that the use of electricity increased by 25 per cent. during the year.

Darwen.—SUPPLY EXTENSIONS.—The Electricity Committee's decision not to supply electricity to Cranberry Lane housing district, challenged by the Town Council recently, has been rescinded, and a supply has now been sanctioned. It is also recommended that a cable be laid from Sett End to Grimehills to meet the demand at Blacksnape.

Detroit (U.S.A.).—NEW GENERATING PLANT.—A *Reuter* message states that improvements contemplated by the Ford Motor Co. include the installation of a 110,000-kW generator, a high-pressure boiler, a 15,000-kW turbine generator, and auxiliary equipment.

Earby.—HIRE-PURCHASE PROJECT.—The clerk to the Urban District Council is to inquire into the possibilities of introducing a scheme for the hire-purchase of electrical domestic appliances.

Easton-on-the-Hill.—STREET LIGHTING.—The streets are to be lighted by electricity.

Ely.—ELECTRICITY FOR BISHOP'S PALACE.—Electricity is to replace oil and candles as the means of illumination at the Bishop's Palace.

Essex.—A CABLE BREAKS.—A broken 33-kV cable at Dagenham set fire to about an acre of grassland last week. There was no interference with the service, the supply being automatically taken over by another cable.

Glasgow.—WIRING-SCHEME PROGRESS.—Under the Electricity Department's scheme 168 houses were wired in June and July, making the total to date 39,190. New hired appliances numbered 133, bringing the total to 16,020.

ELECTRICAL DEVELOPMENTS.—Distributing mains are being

laid at a cost of £20,611, and the Water Department's estimates of capital expenditure to be incurred during 1934-35 include £1,000 for the electrification of Trossachs houses and workshops, while the Municipal Transport Committee proposes to install two additional boilers, each of a capacity of 75,000 lb. per hour, at the Pinkston power station.

SUPPLY CHARGES.—The Housing Committee is negotiating with the Strathclyde Electricity Supply Co., Ltd., with regard to proposed reductions in the company's electricity supply charges.

SUB-STATION SITE.—The Clyde Valley Electrical Power Co. is in negotiation with Glasgow Corporation for the purchase of land at Mugdock Road as a site for the erection of a sub-station.

Hailsham.—OVERHEAD LINES.—The Rural District Council has consented to the erection of overhead lines to Ripe and Chalvington by the Weald Electricity Supply Co., Ltd.

Hyde.—STREET LIGHTING.—The Highways Committee has decided to obtain further tenders for street lighting on the Foxholes Estate by electricity and gas.

Lawrey (Westmorland).—ELECTRICITY FOR THE WINTER.—The Windermere Electric Co.'s recent canvass of the village proved very successful, and it is hoped that most of the houses will be electrically lighted when the supply becomes available in October.

Leominster (Herefordshire).—CABLE LAYING.—We regret that in our last issue, under this heading, we incorrectly stated that the relaying of cables in the streets had been commenced by the Shropshire, Worcestershire & Staffordshire Co. This work is being carried out by the Leominster Electric Supply Co., Ltd., which has no connection with the S.W. & S. Co.

Manchester.—NEW BOILER.—The Electricity Committee is seeking sanction to borrow £33,000 for an additional boiler at the Stuart Street power station.

Midlands.—REDUCED CHARGES.—The Midland Electric Corporation for Power Distribution, Ltd., has increased the discount from the standard tariff contained in the 1933 Special Order by 5 per cent., making a total of 20 per cent. discount. From January 1st next the charge to prepayment consumers will be reduced from 4¾d. to 4½d. per kWh.

Mold.—PUBLIC INQUIRY.—The Electricity Commissions have arranged to hold a public inquiry into the question of supplying electricity to areas on the outskirts of the town.

Morecambe and Heysham.—ILLUMINATIONS.—This year's illuminations will be switched on at the Harbour bandstand by Lord Lonsdale to-morrow, Saturday, and will continue until October 14th.

Newcastle-upon-Tyne.—FINANCIAL RESULT.—The gross revenue of the electricity undertaking was £61,566 in 1933-34, and, after meeting all costs and loan charges, there was a surplus of £6,227, compared with £5,173 the year before. The number of kWh sold was 18,075,075.

Oxford.—HEATING OF NURSES' HOME.—The nurses' home at the Cowley Road hospital is to be electrically heated.

ADDITIONAL MAINS.—The Electricity Committee is to lay mains in St. Ebbe's Street, Bath Place, Bridwell Square, Speedwell Street, New College Lane, and Gloucester Street.

Petersfield.—CANVASS AT HAWKLEY.—It was reported at a recent meeting of the Rural District Council that a canvass of the village of Hawkley showed that about a quarter of the property owners would be willing to use electricity if it were available.

Ross-shire.—NEW ALTERNATOR.—Work is progressing in connection with the installation of an additional alternator at the Loch Luichart hydro-electric works of the Ross-shire Electric Supply Co.

Rugby.—OVERHEAD LINES.—The Rural District Council has consented to the erection of overhead lines at Street Ashton by the Leicestershire & Warwickshire Electric Power Co., but has withheld sanction for a similar line at Pailton, with twenty-one poles, with a view to having the poles placed at the rear of premises as far as possible.

Saffron Walden.—REVISED PROGRAMME.—The Rural District Council requested the Electricity Commissioners to expedite the supply of electricity in the district by the County of London Electricity Supply Co., and a reply was received stating that the company had been asked to submit a revised programme to be carried out in the next three years.

Settle.—STREET LIGHTING.—The Parish Council has decided to accept the Settle District Electricity Co.'s tender of £225 for street lighting in preference to a lower quotation from the Gas Co. (£184).

Skipton.—WATER-HEATERS.—The Electricity Committee has decided to supply water-heaters on hire-purchase terms, the cost, including fixing, to be spread over a period of three years.

South Africa.—KLERKSDORP.—The Town Council is to add a 750-kW turbo-alternator set with boiler plant to the municipal electricity plant. The new power station has been in commission only eight months and is already inadequate to meet the increasing demand. At Brakpan extensions to the municipal electricity supply scheme are under consideration (£14,374).

Southport.—FLOODLIGHTING A LAKE.—The Corporation is experimenting with floodlighting at the sea-bathing lake. Eight G.E.C. lamps situated at various points have been erected, the light being trained on the surface of the water.

Stalybridge.—BOARD'S ACCOUNTS.—The accounts of the Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board for the year ended March 31st, 1934, show that the total revenue increased from £145,415 to £159,988, and the working expenses from £76,192 to £87,983, the net profit being £15,243 (£17,089). The sale of electricity rose from 41,544,778 kWh to 51,726,147 kWh. The chief electrical engineer to the Board is Mr. J. Harwood Lumsden.

REDUCED CHARGES.—The reductions in the electric light and power charges recently introduced by the Board represent a cost of £10,000 on the present consumption.

Stokesley.—INGLEBY ARNCLIFFE SUPPLY.—The Rural District Council has under consideration a scheme for supplying electricity to Ingleby Arncliffe.

Stonehaven.—STREET LIGHTING.—An electric street lighting system was inaugurated last Saturday by Baillie Reid, convenor of the Lighting Committee. The supply is provided by the Grampian Electricity Co.

Sweden.—LARGE CABLES.—A large cable 4½ km. long for the transmission of power from the south of Sweden to the island of Oeland is reported to have been supplied by Messrs. Felton & Guilleaume. The diameter is 125 mm. and the weight 39.5 tons per 1,000 metres of length. A second cable is intended for Holland and will be laid in the Rhine near Nymwegen. This will be 6 km. long for the river section and 6½ km. for the land section. The diameter of the former is 145 mm., and that of the latter 132 mm., the weight per 1,000 metres being 52.5 tons and 36.5 tons in the two cases respectively. These cables are assumed to be the heaviest yet produced.

STATE WATERFALLS DEPARTMENT.—The State Waterfalls Department reports a profit during 1933 of 16.5 million kronor (£908,535 at par), which is 0.7 million (£38,546) above the 1932 figure. The yield on the average working capital invested by the Government during 1933 amounts to 5.68 per cent., against 5.53 per cent. for the preceding year. The total consumption of electrical energy during the past year is estimated at 1,800 million kWh, an increase of 11.4 per cent. over 1932.

SUPPLY FROM DENMARK.—The director of the North Jutland Electricity Supply Co. reports that the severe drought in Sweden has necessitated a considerable amount of electricity being taken from Denmark. Normally Sweden supplies 50 to 100 million kWh to Denmark, but now the latter has supplied to the former 20 million kWh in recent months under the mutual supply agreement.

Turton.—TREE STRIKES CABLES.—A large oak tree, in falling, brought down several overhead cables, and a number of consumers were without supplies for a time.

Whiteshill (Gloucester).—CHURCH LIGHTING.—It has been decided to have electric lighting installed at the Parish Church.

Wick.—SCHEME DROPPED.—The Town Council's scheme to extend the electricity supply to Thurso and villages nearby has been dropped. It was reported that Thurso Town Council had come to a definite arrangement with a private company, which was also to supply electricity to Castletown, Halkirk, Spittal, and Watten.

Willesden.—NEW STREET LIGHTING.—The Corporation has completed an installation of G.E.C. " Osira " lamps at Dudden

" Osira " lighting at Willesden

Hill Lane and Neasden Lane. The lamps are in " Lewisham " lanterns for distributing the lighting in the direction of the flow of the traffic, except at intersections, where " Watford " lanterns specially arranged in a central position are used. The regular mounting height of the lighting units is about 25 ft., and the spacing approximately 160 ft., with poles staggered on each side of the road.

Witney.—LOAN FOR METERS.—The Urban District Council is to apply for sanction to a loan of £2,000 for meters.

Traction

Australia.—N.S.W. TRAMWAYS.—The commissioner for road transport in New South Wales reports that for the past year there was a net profit of £58,745 on the Sydney tramways. On the Newcastle tramways there was a profit of £1,630 after meeting interest and other charges, but after setting aside £21,002 for depreciation there was a net loss of £19,372.

France.—TROLLEY AND BATTERY VEHICLE.—An interesting electric locomotive has recently been completed by the Société Alsthom (Paris) for the works of the Société des Hauts Fourneaux et Acieries de Differdange. Part of the works is provided with an overhead electric line, but it has not been found possible to extend this to the blast furnaces, and in order to avoid employing two types of electric locomotive for the transport of one load of material the new machine is adapted both for trolley wire and battery propulsion. The vehicle measures 38½ ft. overall, and has a central driver's cabin. Under the bonnets at the front and rear are the accumulators and battery charging and starting resistances. The machine is mounted on two bogies each having two electric motors, and weighs 70 tons (mechanical part 37 tons, electrical equipment 21 tons, and batteries 12 tons).

Germany.—BLACK FOREST RAILWAY ELECTRIFICATION.—Conversion work on the Freiburg-Neustadt and Titisee-Seebrugg lines of the German State Railway in the Black Forest is progressing apace, and electrical operation will commence with the inauguration of the 1935 summer time-table. In the meantime, traffic is being operated by Diesel-electric railcars.

Glasgow.—TRAMWAY EXTENSION.—The Corporation has agreed to proceed with the tramway extension between Hillfoot and Milngavie at a cost of £3,000. Overhead wires are to be erected, and the service will be inaugurated as soon as possible.

PROJECTED EXPENDITURE.—The transport manager's estimate of capital expenditure for the year ending May 31st, 1935, approved by the committee, contains the following: Tramway section: Power-station plant, £45,000; electrical equipment of line, £1,000; cars, £50,000; plant and sundries, £20,000. Subway section: Electrification, £75,000.

Halifax.—TRAMWAY FINANCES.—Although the revenue of the Tramways Department fell last year from £129,105 to £126,007, the gross profit shows an increase from £16,819 to £20,198. There was, however, a net deficit of £19,809, which brings the accumulated deficit (after allowing for a surplus of £14,799 on the buses) to £127,706.

Ipswich.—ANNUAL REPORT.—In his report on the working of the Transport Department Mr. H. E. Blackiston states that there has been a good increase in the income during the year, the actual turn taking place during the summer last year. By September the increase was averaging out at £80 per week. A further augmentation of the receipts took place after the alteration in the conditions and prices of the workers' return tickets in November. The Department's vehicles comprise trolley-buses and tramways, 18.15 route-miles being worked. Statistical information is as follows, last year's figures being shown in parentheses: Total revenue, £75,081 (£70,918); working expenses, £58,093 (£55,651); net profit, £2,469 (£660); bus mileage, 1,544,213 (1,522,392); passengers carried, 13,325,285 (12,676,547). A profit of £5,650 was made on the trolley-buses and a loss of £3,180 on the trams.

Nelson.—CONVERSION.—The Corporation has appointed a committee to meet the Burnley, Nelson and Colne Joint Transport Committee in connection with the proposal to substitute buses for trams on a route affecting Nelson. For the present, Nelson Corporation's consent to the change-over has been withheld.

Newcastle-on-Tyne.—A PROFITABLE YEAR.—The annual report of the City Council's transport undertaking shows a profit of £10,772. The total revenue amounted to £390,670, compared with £389,190 in the previous year, and the total working expenses amounted to £310,927 (£309,258). The number of miles operated was 6,052,120, and the number of passengers carried 75,475,601. Mr. T. P. Easten is general manager of the undertaking.

Nottingham.—MORE TROLLEY-BUSES.—To cope with the growing traffic on the London Road and Colwick Road routes, the Passenger Transport Committee is to invite tenders for thirty more double-deck trolley-buses.

Southern Railway.—ELECTRIFICATION SUCCESS.—The Southern Railway Co.'s traffic figures for the Bickley Junction-St. Mary Cray line, which has been operated by electric traction since May 1st this year, show that during May 27,879 passenger journeys were made over this section of the line, compared with 16,058 in May, 1933, an increase of over 73 per cent.

Traffic Signals.—Hove Corporation has been informed that a Ministry of Transport grant of 60 per cent. of the estimated cost (£1,352) will be made towards the erection of vehicle-actuated traffic signals at the junction of Old Shoreham Road with Upper Drive and with Sackville Road.

Glasgow Corporation Streets Committee has approved the erection of "Electromatic" traffic signals at Eglinton Toll, and has arranged to construct traffic islands and to erect illuminated traffic signs at the east and west approach roadways to the bridge at Shieldhall.

Communications

Australia.—MORE TELEPHONES IN USE.—In June 2,242 new telephones were installed in Australia, making the increase for the financial year 1933-34 13,740 instruments. At the end of June there were 501,402 telephones in operation in the Commonwealth, compared with the record of 520,180 reached in April, 1930.

RADIO LICENCE FEES.—In the Budget proposals introduced by Mr. Lyons, the Federal Premier, the radio listener's licence fee is reduced from 24s. to 21s.

France.—PARIS-MOSCOW LINK.—Direct telephonic communication between Paris and Moscow was established for the first time last week. The French Minister of Posts inaugurated the service by making a call to the Soviet Ministry.—*Reuter.*

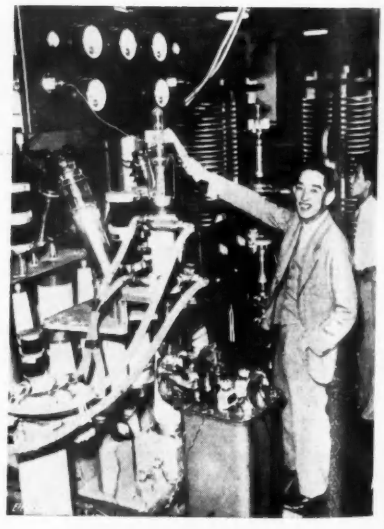
Great Britain.—RADIO AIDS POLICE.—The autogiro, in which experimental flights over London are being made by Scotland Yard officers in order to determine the possible value of this class of aircraft for traffic control and other purposes, has been fitted with Marconi transmitting and receiving equipment to enable it to maintain two-way communication with the ground.

The Marconi apparatus is compact and light. Both the transmitting and receiving panels are fitted beneath the dashboard in the observer's cockpit of the autogiro, and the total weight of the equipment, including batteries and all accessories, is 70lb. The transmitter is arranged for continuous wave telegraph working and comprises a master oscillator and magnifier circuit. The receiver is a straightforward three-valve instrument.

DROITWICH.—The B.B.C. announced that the new long-wave transmitter at Droitwich was to radiate its first transmissions intended for reception by the public yesterday (Thursday). To-day the new station will radiate the morning National programme from 10.15 to 11.55 a.m. and also the late dance music, and it will continue to do this each weekday until taking over the full service of the National programme. Droitwich will then replace Daventry 5XX, using the same wavelength (1,500 metres, 200 kc/s). There will be no need, therefore, for listeners to make any change in the tuning of their receivers.

TELEPHONE BREAKDOWN.—A breakdown in the main trunk cable between Glasgow and Edinburgh, owing to flooding, was responsible on Wednesday, August 29th, for the dislocation of the telephone service from Glasgow to London and the principal English centres. The damage was soon repaired and the normal service was in operation on the following day.

India.—EXTENSION OF BROADCASTING.—Steps to be taken for the extension of broadcasting in India include the establishment of a new station at Delhi and the appointment of an expert as director of the station and as controller of broadcasting generally. The Government also contemplates assisting Provincial governments to start operations on their own. Linking of the Kirkee (Poona) telephone transmitter of the Indian Radio & Cable Communications Co., Ltd., with the Bombay studios of the State broadcasting service has resulted in the Bombay programme being heard in most parts of the world. The transmitting station at Kirkee is about 120 miles from the studio, and the two are connected by a pair of telephone lines which traverse forests and deep gorges, and are in proximity to high voltage power transmission and d.c. traction circuits.



A new 100-kW broadcasting apparatus has been invented by Dr. Niwa, professor of Waseda University, Tokyo, who is noted as the inventor of the Niwa-type television set. Our picture shows Dr. Niwa with the new apparatus, which is to be used by the Japan Wireless Telephone Co., Tokyo

Italy.—TELEPHONE PROGRESS.—An official report shows that at the end of June, 1933, the length of the telephone system in Italy amounted to 91,655 miles, 10,330 miles being on international service, and 81,325 miles on national work. Operations in connection with placing the telephone lines underground are steadily progressing. There now remains a length of about 20,000 miles of overhead lines.

Sweden.—NEW HIGH-POWER TRANSMISSION.—We understand that the new 150-kW transmitter which is at present under construction will be completed by January next.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Argentina.—BUENOS AIRES.—October 1st. State Railways. Two electrically operated turntables. (G.Y. 14169.)*

Australia.—MELBOURNE.—State Electricity Commission of Victoria. October 1st. Oil circuit-breaker equipment. (A.Y. 12571.)*

Victorian Railways. October 17th. Selector telephone equipment consisting of a control office with thirteen radiating lines. (A.Y. 12532.)*

TOWNSVILLE.—October 11th. One 1,000-kW self-contained turbo-alternator unit complete with exciter auxiliary plant and all necessary instruments and fittings. (A.Y. 12535.)*

Azores.—PONTA DELGADA.—November 5th. Municipal Council. Hydro-electric plant comprising Francis turbine, 3-phase alternator, oil-cooled transformer, switchgear, &c. (A.Y. 12504.)*

Barnes.—September 12th. Corporation. Traffic control signals. (August 10th.)

Beckenham.—September 24th. U.D.C. House service meters. (See this issue.)

Belfast.—September 10th. Corporation. Lighting, heating, bells, telephones, &c., at Puredysburn Villa Colony. Specifications from N. Fitzsimons, Friends' Provident Building, Howard Street (deposit £3 3s.).

September 10th. Electric lighting installation, &c., at Massereene Hospital, Antrim. Particulars from F. D. Brown, 93, Anne Street (deposit £2 2s.).

Birmingham.—October 2nd. Electric Supply Department. H.p. and p.i. cables during a period of twelve months ending October 31st, 1935. (See this issue.)

Brighton.—September 10th. Corporation. One 30,000-kW turbo-alternator with condensing plant and auxiliaries, and one 150,000-lb. steam-raising unit. (August 10th.)

Cardiff.—September 18th. Electricity Department. Supply and laying of e.h.p. and l.p. cables and supply and erection of transformer kiosks. (See this issue.)

Cheddleton.—September 10th. Mental Hospital Committee. Six months' supply of stores, including electric lamps. Mr. E. Lawton, clerk to the Hospital.

Durham.—September 10th. County Public Assistance Committee. Six months' supply of various goods, including electric lamps, for Lanchester Cottage Homes and Institution. Particulars from R. Davis, Area Public Assistance Officer, Guardians' Committee Offices, Lanchester.

County Water Board. Electric lighting and heating installation, including the provision of water turbine and generator, at the Honeyhill filter beds, Waskerley. Plans by the Engineer, 227, Newgate Street, Bishop Auckland.

East Africa.—MOZAMBIQUE.—October 15th. Port and Railway Administration. Gas producer, motor, alternator, and distribution board. (G.Y. 14075.)*

East Sussex.—September 10th. Public Assistance Committee. Six months' supply of stores, including electric lamps for eleven Poor Law Institutions. Particulars from Public Assistance Officer, West Street, Lewes.

Ecuador.—QUITO.—November 13th. Municipality. Electric power plant (3,000 h.p.), street-lighting equipment, &c. (A.Y. 12589.)*

Egypt.—CAIRO.—October 18th. Ministry of Public Works. Evacuating and dewatering pumps with electric motors, switchgear, main electric motors, accessories, switchgear and accessories, main and auxiliary transformers and accessories, oil for transformers and circuit-breakers, station electric lighting and equipment, and filter plant and accessories. (G.Y. 14151.)*

October 16th. Ministry of the Interior. Sub-station equipment, distribution and transmission lines for Tima. (A.Y. 12560.)*

November 3rd. Electrical material in connection with the installation of overhead and underground networks at Barrages. (A.Y. 12591.)*

GIZA.—December 8th. Ministry of Public Instruction. Apparatus for the electrical laboratory of the Royal School of Engineering. (A.Y. 12577.)*

Farnworth.—September 15th. Electricity Department. T.r. and v.i.r. cables for one year. (August 24th.)

Halifax.—September 14th. Town Council. Vehicle-actuated traffic signals at North Bridge. Particulars from Borough Engineer (deposit £1 1s.).

Hastings.—September 28th. Corporation. Converting to electric drive the time and striking mechanism of the clock in the Albert Memorial. (See this issue.)

Horwich.—September 10th. Electricity Department. Electrical materials. (August 24th.)

India.—DELHI.—Various dates. Stores Department. Ceiling and table fans (a.c. and d.c.) as required during the period April 1st, 1935, to March 31st, 1936. (A.Y. 12578-80.)*

September 21st. Bombay, Baroda and Central India Railway Co. 400-kW heavy oil engine driven generating set. (See this issue.)

September 28th. Plates, separators, &c., for train-lighting accumulators. (See this issue.)

Keighley.—September 14th. Electricity Committee. Two h.p. overhead lines in the Oaksworth district. Particulars from borough electrical engineer, Electricity Offices, Coney Lane.

Leeds.—September 15th. City Council. Boiler house equipment for Kirkstall power station extensions. Particulars from Mr. C. Nelson Hefford, 1, Whitehall Road, Leeds (deposit £5). (August 17th.)

Lincoln.—September 10th. Electricity Department. P.i. and r.i. cables, cookers, joint boxes and shells, consumers' fuse boxes, network boxes and meters. (August 24th.)

London.—DEPTFORD.—September 19th. Borough Council. Vehicle-actuated traffic signals at Lewisham High Road and New Cross Road. Particulars from Borough Engineer, Town Hall.

WEST HAM.—September 10th. Single-phase a.c. prepayment meters, transformers, and v.i.r. and t.r.s. wires and cables for twelve months ending September 30th, 1935. (August 24th.)

KENSINGTON.—September 12th. Borough Council. Vehicle-actuated traffic control signals at five street junctions. Specifications from Borough Engineer and Surveyor, Town Hall, W.8.

EDMONTON.—September 15th. Urban District Council. Automatic traffic signals. Particulars from borough engineer and surveyor (deposit £2 2s.).

Midlothian.—September 12th. County Council. Various works, including electrical, at 104 houses at West Calder. Schedules, &c., from County Architect, 10, Drumsheugh Gardens, Edinburgh.

New Mills.—September 19th. Electricity Department. Cables, equipment and poles. (See this issue.)

New Zealand.—WELLINGTON.—Post and Telegraph Department. October 10th. Telephone cable (A.Y. 12554.)* (A.Y. 12555.)*

November 1st. Dynamo sets. (A.Y. 12592.)*

October 17th. 5,000 four-conductor and 500 six-conductor telephone instrument cords. (A.Y. 12553.)*

Public Works Department. October 16th. Three 110-kV liquid fuses with fittings and three spare fuses. (A.Y. 12593.)*

Sheffield.—September 18th. Electricity Department. Cooling towers and civil and constructional engineering work at Blackburn Meadows generating station, and civil and constructional engineering work at Neepsend power station. (August 3rd.)

Tasmania.—HOBART.—October 1st. Municipal Tramways. Electric motors and control and air-brake equipment for two tramcars. (G.Y. 14195.)*

Hydro-electric Commission. October 22nd. Four transformers for the Rosebery sub-station. (A.Y. 12584.)*

Uruguay.—MONTEVIDEO.—September 28th. State Electricity Supply and Telephone Administration. H. and l.p. p.i. l.c. and s.a. cables and joint boxes. (A.Y. 12575.)*

October 19th. Transformer sub-station equipments. (A.Y. 12602.)*

October 29th. L.c. v.i.r. cables of various types. (A.Y. 12601.)*

Walthamstow.—September 28th. Electricity Department. E.h.p. and l.p. a.c. switchgear. (See this issue.)

Warrington.—September 18th. Electricity Department. Twelve months' supply of e.h.p. and l.p. paper-insulated and lead-covered (and other) cables, earthenware conduits, cable protector slabs and tiles. (August 31st.)

Wednesbury.—September 8th. Town Council. Electric wiring installation at ninety-eight houses at Dangerfield Lane. Particulars from Borough Surveyor (deposit 10s. 6d.).

Wigtown.—September 10th. County Council. Various works, including electric tubing, at seventy-four houses. Specifications from R. G. Logan, county architect, Stranraer (deposit £1); tenders to County Clerk, County Buildings, Stranraer.

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Amersham.—Rural Council. Accepted. Wiring for electric lighting of Council houses, Chalfont (£171).—Birk & Son.

Belfast.—Accepted. Thermal storage plant for the Maternity Hospital and Nurses' Home of the Infirmary (£2,000).—A. Reyrolle & Co., Ltd.

Droitwich.—Rural District Council. Accepted. Installation of electric heating (£45), lighting (£66), and electrical fittings (£33).—Abel & Smith.

Glasgow.—Transport Committee. Accepted. L.c. cables.—Craigpark Electric Cable Co., Ltd.; Standard Telephones & Cables, Ltd. Batteries for Leyland heavy oil engines.—Chloride Electrical Storage Co., Ltd.

Cleansing Committee. Accepted. Electric hoist (£179).—Paterson Hughes Engineering Co., Ltd.

Accepted. Electrical equipment at the new cinema, Renfield Street.—W. Draper & Co., Ltd.

Manchester.—City Council. Recommended. 30,000-kW turbo-alternator with condensing plant.—Metropolitan-Vickers Electrical Co., Ltd.

North Bucks.—Joint Hospital Board. Accepted. Installation of electric lighting at the hospital.—Griffin Bros.

Oxford.—Property Committee. Recommended. Re-wiring municipal buildings (£1,136).—Lowe & Oliver.

Salford.—Electricity Committee. Recommended. Switchgear (£520).—Switchgear & Cowans, Ltd.

Notes

The Institute of Metals

The twenty-sixth annual autumn meeting of the Institute of Metals was held in Manchester from September 3rd to 6th. A large proportion of the papers dealt with white-metal bearings and tin-alloys. Developments in the internal-combustion engine are imposing increasingly severe conditions on the bearings, and in a paper by Mr. D. S. MacNaughton consideration was given to the theoretical functions of ideal white metal and the manner in which the stresses produced in service tend to cause failure by cracking. Since the normal action of the stresses is compressive, special attention was given to the tension stresses which lower the fatigue range and open incipient cracks. Other subjects discussed included the effect of pickling duralumin, cold-worked nickel, crystal densities of brass as shown by X-rays, the annealing and elongation of copper wires, and spectographic investigations.

Educational

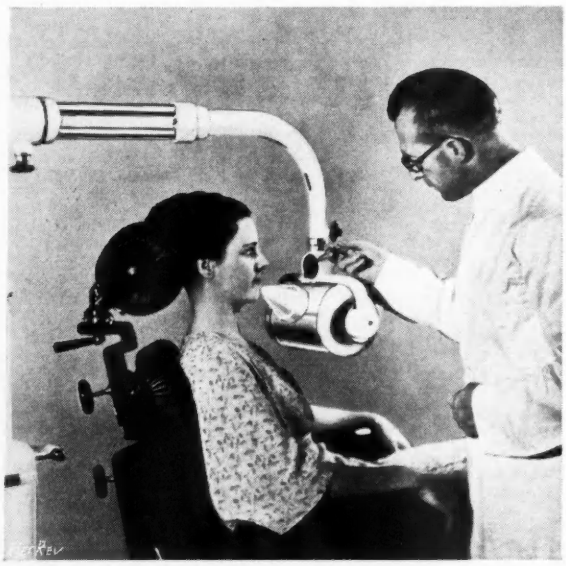
The Polytechnic, Regent Street, W., commences its 1934-5 courses in electrical engineering, telephony and telegraphy, and wireless and high frequency engineering on September 24th. On the same date two special courses will commence, each of twenty-four lectures, on electrical technology.

An entrance examination will be held on September 25th and 26th at the Northampton Polytechnic Institute, E.C., for the full-time course in engineering.

(See our classified advertisements.)

A Small Dental X-ray Unit

An interesting exhibit at the National Dental Exhibition which opened at Cheltenham on Tuesday is the "Centralix" dental X-ray outfit on the Philips stand; the X-ray tube itself is surrounded by the transformer, and a remarkable compactness is the result. The unit, in fact, is little larger than a packet of cigarettes, and weighs under eighteen pounds. Yet



The "Centralix" X-ray unit in use

in spite of its lightness and small size it produces X-ray photographs which are claimed to be more detailed and sharper in definition than the old and more cumbersome apparatus. By an ingenious arrangement it can be adjusted for any a.c. mains voltage: it is easily transportable and a length of flex is all that is needed to connect it to an ordinary electric lamp socket. When mounted to the stand the automatic timing switch of the "Centralix" is incorporated in the trunnion on which the X-ray unit rotates.

Lighting in Coal Mines

Part I of the Coal Mines General Regulations (Lighting) 1934 came into force on September 1st. The Mines Department has issued a circular (M.D. No. 72) which contains first lists of the types of safety lamps and bulbs that have been approved by the Board of Trade.

The Secretary for Mines has also made two subsidiary Orders in relation to safety lamps. The first, the Safety Lamps (Conditions of Use) Order 1934 (which came into force on July 11th) (No. 729, 1d.), prescribes general conditions of use of approved safety lamps. The second Order (which came into force on September 1st) provides that the official approval-mark shall be applied to the glass if there is insufficient space on the cap of the bulb.

The Shannon's Shortcomings

According to the Dublin correspondent of the *Sunday Times* the Shannon scheme is not coming up to expectations. Originally it was intended that the scheme should supply sufficient electrical energy for the whole of the Irish Free State at a capital cost of £5,000,000. Up to date the expenditure has been over £10,000,000 and a further outlay which may amount to as much as £4,000,000 is in contemplation. In 1932 the total output of electricity in the Free State was 151.8 million kWh, of which the Shannon was responsible for 150.9 millions. In the year ended March 31st last, however, while the total production amounted to 185 million kWh, only 103 million kWh came from the Shannon. The old Pigeon House steam station in Dublin had to be put back into full service and it produced over 40 per cent. of the energy required. It has become necessary to maintain the station in full commission. It is further reported that investigations are proceeding with a view to the erection of a hydro-electric station on the Liffey, at Poulaphouca—a scheme which has been broached before. The capital cost of this is put at £2,000,000.

Electricity Costs in Canada

In compiling a schedule of index numbers to indicate the changes in the cost of electricity to domestic and small house consumers, the Canadian Department of Trade & Commerce has taken the 1926 figures as a basis and extended them to include up to the 1933 returns. The Bureau has compared costs of specific quantities and services rather than rates or costs in general. Average figures are given for each of the undertakings. Taking 1926 as a base for different hours of use per month, the index numbers show a progressive decline for the whole of Canada from 100 per cent. to 88.65 per cent. in 1932, rising slightly to 88.96 last year. The average revenue per kWh for all electricity produced in Canada in 1932 was 0.375d., including up to 25 per cent. distribution losses in some cases. For domestic uses the figure was 1.11d. for a monthly consumption of 101 kWh, as compared with 2.79d. for 50 kWh in the United States. The position in Canada is not strictly comparable with that in the United States chiefly in view of the large amounts of power sold to pulp and paper mills in Canada, which affects even the domestic rates.

A Commercial Manager for Sydney

The Electricity Committee of Sydney City Council has decided to recommend the appointment of a commercial manager of the Municipal Electricity Department at a salary of £1,200 a year. The position may be filled from within the Corporation's service. The duties of the new official will be to improve the relationships between the Department and its customers and generally to supervise the sale of electricity.

Radio Apparatus Production in Belgium

The works of the Usines Philips at Louvain, which was established four years ago mainly for the promotion of the export trade and which had to discontinue activity owing to the restrictions in foreign markets, has now been restarted as a result of the growth in the demand in the Belgian home market. The new programme of construction comprises seven new types of receivers, three of the octode super type and four of the super inductance type.

Lectures on Electricity for Women

A course of twelve weekly lectures, to include simple experiments, has been prepared for the following:—(*a*) Candidates for the examination for the certificate offered by the Electrical Association for Women; (*b*) women with domestic science training who wish to qualify for an appointment in the electrical industry; (*c*) women who sell or demonstrate electrical apparatus; (*d*) professional and other women who are interested in the electrical world. After each lecture there will be an informal discussion. Tours are to be made of selected works and other places of interest. A short homework paper is set each week. By the courtesy of Miss Caroline Haslett and the Committee of the Electrical Association for Women, the lectures will be held at the E.A.W. Headquarters, 20, Regent Street, S.W.1, at 7.30 every Wednesday evening, commencing on September 26th, 1934. Further particulars and information regarding fees can be obtained from Miss E. Robinson, 96, Boundary Road, St. John's Wood, N.W.8.

Relays for Railway Signalling

The fifth and sixth in the series of British Standard Specifications for railway signalling relays recently issued deal respectively with a.c. line relays of the single-element two-position and the two-element three-position induction types. In general form these new specifications follow the lines of the previous ones of the series, but the performance characteristics are in each case peculiar to the particular type of relay. Copies of these specifications (Nos. 557 and 561-1934) may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. each, post free.

Appointments Vacant

Visiting teacher in electrical installation work at the School of Engineering & Navigation, Poplar, E., for the L.C.C.

Lady demonstrator for Cheltenham Electricity Department.

(See our Classifield Advertisements.)

Makers' Names Wanted

Electrical scent sprayers.

WONDERLIFE shop-window reflector.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Major Edwin H. Armstrong has been appointed professor of electrical engineering in the Columbia University, New York. Major Armstrong, who is well known for his work in the sphere of radio communication, succeeds the late Professor J. H. Morecroft.

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Professor E. V. Appleton, who opened a discussion on Polar radio conditions at the British Association meeting yesterday. **(See page 310)**

Mr. S. Griffiths, director of Messrs. Higgins & Griffiths, Ltd., in voluntary liquidation, has been elected director of Duncan Watson (Electrical Engineers), Ltd.

Sir Thomas Wilford, K.C.M.G., late High Commissioner for New Zealand and a director of the National Bank of New Zealand, has joined the board of Sternol, Ltd.

Mr. S. F. Wheeler has been appointed acting manager of the Glasgow Depot of E.M.I. Service, Ltd., in place of Mr. J. L. Badger, who has resigned to enter the retail trade.

Mr. E. J. Doyle has resigned his position as Midland manager of Messrs. Belling & Co. to take up the appointment of provincial sales director with the Kniveton Cable Works, Ltd., Ponders End.

Mr. R. Liddelow, manager of the Victoria Electricity Commission, has recently returned to Melbourne after a five-months' visit to England, the United States and Canada. While in London he arranged for the conversion of Melbourne Metropolitan Electricity Supply debentures and new money for the purchase of the Ballarat and Bendigo undertakings of the Electric Supply Company of Victoria, Ltd.

Mr. R. C. W. Joyce has taken up the position of assistant engineer in the Mains Department of the Westminster Electric Supply Corporation, Ltd., after a year and a half with the Lighting Service Bureau as floodlighting specialist. He received his technical training at the Borough Polytechnic Institute and the East London College, and was for two years on the staff of Ericsson Telephones, Ltd., following which he was for one year with Messrs. Higgins & Griffiths, Ltd., before joining E.L.M.A. (Lighting Service Bureau). He was on the committee of the London Students' Section of

Mr. R. C. W. Joyce **Mr. T. Machell**

the I.E.E. for several years, and for two years was hon. assistant secretary.

Mr. T. Machell, who has been with the Lighting Service Bureau for two and a half years, has joined the Sheffield office of the Foster Engineering Co. as a sales manager.

Mr. F. J. Chapman, who is on the staff of the Melton Mowbray Electric Light Co., Ltd., was married at St. Michael's Church, Hickling, on August 22nd, to Miss Norah Spencer, of Hickling.

Mr. L. W. Harthill, A.M.I.E.E., mains engineer at the Mansfield Corporation electricity works, was married recently to Miss N. Allen, daughter of Mr. W. Allen, A.M.I.E.E., of Mansfield.

Mr. Felix A. Rogers, Secretary to the Electrical Fair Trading Council, has been connected with the electrical industry since 1908. He received his training at the Regent Street

Mr. F. A. Rogers

Polytechnic, and in the shops, general office and drawing office of James Keith & Blackman Co., Ltd. In 1913 he joined Messrs. Siemens Bros. & Co., Ltd., until 1919, when he left to take charge of the production and estimating department of the International Electric Co., Ltd. In 1922 Mr. Rogers became the chief estimating engineer to Marconi's Wireless Telegraph Co., Ltd., Chelmsford, and later became the personal assistant to the manager of the Chelmsford works. In 1929 he went to Paris to take over the full control of the French branch of Pettigrew & Merriman (1925), Ltd., at that time the largest wholesale radio and electrical firm in that country. Mr. Rogers resigned from Messrs. Pettigrew & Merriman to take up his present position in October, 1933.

Mr. F. H. Williams, M.I.E.E., A.M.I.C.E., has been appointed by the Galloway Water Power Co. as manager of its works in Galloway. Mr. Williams, who will take up his duties on October 1st next, is at present with Messrs. Merz & McLellan, Newcastle - upon - Tyne. Before joining Messrs. Merz & McLellan he was in charge of the testing laboratory of the Manchester Corporation. He has been closely connected with the construction of the works during the past three years. He was chairman of the North-Eastern Centre of the I.E.E. for the year 1933-34.

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Mr. F. H. Williams

Mr. J. Warnock has also been appointed by the company as assistant manager. Mr. Warnock is at present with the company as senior clerk of work on the erection of the plant.

Mr. R. A. Bill, sales manager and a director of S. Bill & Co., Ltd., was recently married at Handsworth Old Church,

Mr. and Mrs. R. A. Bill

Handsworth, Birmingham. Our picture shows Mr. and Mrs. Bill after the ceremony.

Obituary.—Mr. G. Palgrave Simpson.—Many of our older readers will learn with regret that Mr. George Palgrave Simpson died on Friday last week, August 31st. He was for many years a well-known figure in the electrical industry, and was associated with some of the leading concerns. The cremation took place at Golders Green on Monday last.

L.N.E.R. Electrification Improvements

AN extensive scheme of modernisation is being carried out by the London and North-Eastern Railway in the Tyneside electrified area, where electric working was introduced in 1904. The gradual increase in the weight of trains resulted in a severe voltage drop on certain sections of the distribution system adversely affecting the speed and lighting of trains. To counteract this the company has built two new sub-stations, at Earsdon Grange and Gosforth East, which are remotely controlled from two of the original sub-stations so that no additional operating staff is required. At times of light load the new sub-stations are shut down entirely, but can be started up and put on load literally in a minute.

Under the comprehensive scheme for standardisation of the frequency of electricity supplies in the area, all the original rotary convertors and transformers are being replaced by up-to-date machinery so that from the point of view of current supply the new train service will be in a favourable position. In addition, voltage drop and losses of power are being reduced by replacement of conductor rails in certain places. A 50 per cent. larger section, with fittings to conform with modern standards, has already helped towards faster speeds on the heavy gradients near Jesmond and Backworth. Other portions of the line where traffic is heavy will be similarly treated in due course.

Other new operating facilities have arisen from alteration to the tracks of North Shields tunnel, and the institution of either-way working between Central and Manors Stations. A new station has been built at West Monkseaton to serve a rapidly growing residential area. Some lengths of track circuiting are being introduced in conjunction with other signal improvements calculated to increase the traffic capacity of the lines.

A large proportion of the electric rolling stock is to be replaced; the remainder will have new electrical equipment and electro-pneumatic brakes, and will be generally reconditioned. The new stock will consist of forty-four twin motor-trailer units and three motor vans; one existing van will be re-equipped electrically, and fitted for working with either electro-pneumatic or vacuum braked stock; thirty-five existing motor and trailer coaches will have new electrical and brake equipments, and will be reconstituted as eight four-coach units with three double-driving vehicles for special purposes; and the six-coach trailer set of compartment stock will be modified for electro-pneumatic brake operation.

The new vehicles will be of steel, of the open or saloon type, with sliding doors at each end and bucket seats. The internal and external finish will resemble closely that used for the new "tourist" trains on the L.N.E.R., and decoration, ventilation, lighting and heating will incorporate the latest designs and materials. Full advantage will be taken of the recent developments in the design of traction motors and control gear to provide equipment that will give acceleration and speeds to compare favourably with those obtaining on any suburban service in the country.

The whole effect of this new work should be to introduce a note of brightness and progress at a time when the Tyneside area seems to be slowly emerging from a long period of depression.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Automatic Electrical & Mechanical Controls, Ltd.—Public company. Registered August 25th. Nominal capital, £500 in 2s. shares. Objects: To adopt an agreement with Light Controlled Installations, Ltd., and G C. Jarvis, the liquidator thereof, and to carry on the business of manufacturers of and dealers in and contractors for the supply, letting on hire, installation and maintenance of plant, machinery and installations operated or controlled by light-sensitive cells of the selenium photo-electric or other types for industrial, commercial or other use, television and radio apparatus, instruments for recording and reproducing sound in synchronisation with cinematograph films, manufacturers and refiners of selenium or its compounds, &c. The subscribers are: H. E. Skan, 4, Copthall Chambers, E.C.2, and six others. Registered office: 115-117, Cannon Street, E.C.4.

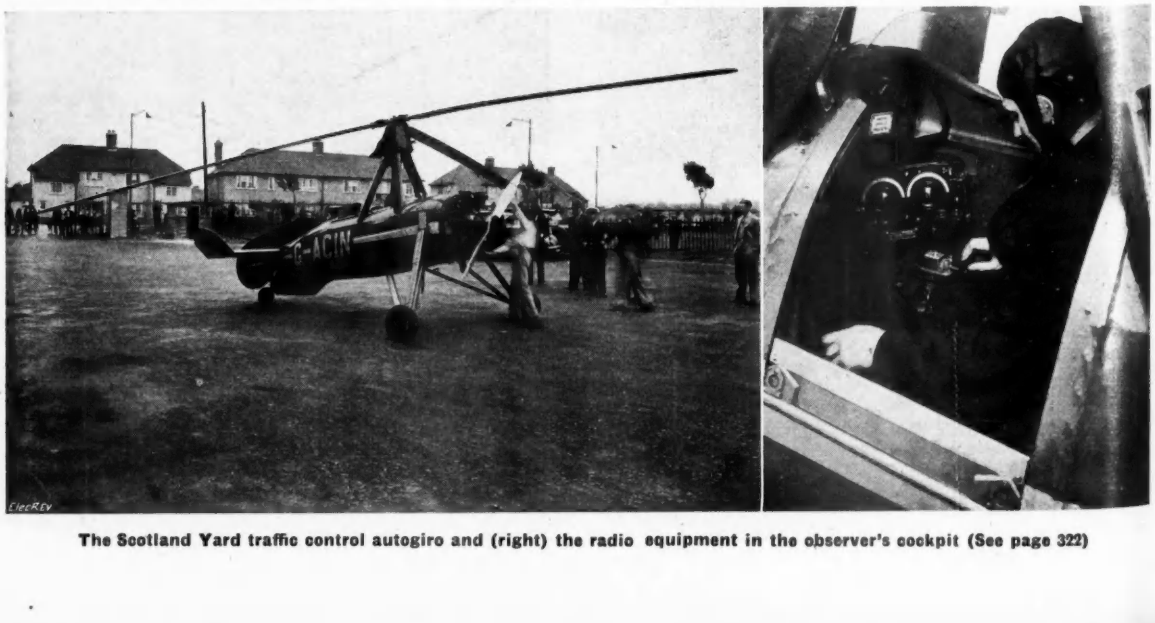
Mechanical & Electrical Guarantee Association, Ltd.—Private company. Registered in Edinburgh August 30th. Capital, £1,500 in £1 shares. Objects: To acquire the business of maintenance engineers and insurance agents carried on at 250, Hope Street, Glasgow, C.2, by the Mechanical and Electrical Guarantee Association. The first directors are: A. I. Milne, 16, Medlock Street, Glasgow, S.W.1, and two others. Registered office: 250, Hope Street, Glasgow.

Midland Radio Distributors, Ltd.—Private company. Registered August 29th. Capital, £1,000 in £1 shares. Objects: To carry on the business of dealers in and distributors and manufacturers of radio receivers, electrical, wireless, television and sound recording and reproducing apparatus, &c. The first directors are: E. C. C. Charlesworth, 56, Vicarage Road, Yardley, Birmingham, and C. Crosskey, 17, Greenfield Crescent, Edgbaston, Birmingham. Solicitors: Ryland Martineau & Co., 41, Church Street, Birmingham.

Arthur English, Ltd.—Private company. Registered August 28th. Capital, £4,000 in £1 shares. Objects: To carry on business as electrical engineers and general electrical installation contractors, &c. The directors are: A. English, "Inverugie," The Drive, Adel, Leeds, and J. D. English, "St. Clair," Moseley Wood Lane, Horsforth, near Leeds. Solicitor: A. Conway, 93a, Albion Street, Leeds.

Oldham District Relays, Ltd.—Private company. Registered August 27th. Capital, £1,000 in £1 shares. Objects: To carry on the business of a wireless relay, telephone, telegraph, television, cable and wireless communication company, &c. The first directors are: W. Roberts, "Craigmore," Blacke, Nelson, and two others. Registered office: 16, Sandy Lane, Royton, Lancs.

Brightglow, Ltd.—Private company. Registered August 30th. Capital, £500 in £1 shares. Objects: To carry on the business of electrical and mechanical engineers, wireless engineers, manufacturers of and dealers in dynamos, accumulators, lamps, valves, &c. The permanent directors are: A. L. Beak, and Mrs. Mabel K. Beak, both of 21, Tanfield Avenue, N.W. Registered office: 21, Tanfield Avenue, N.W.2.



The Scotland Yard traffic control autogiro and (right) the radio equipment in the observer's cockpit (See page 322)

Returns of Electrical Companies

Calcutta Electric Supply Corporation, Ltd.—Trust deed, securing second mortgage debentures for Rs.5,32,000 (amount owing at date), dated October 30th, 1926, charged on lands, hereditaments and premises specified in the first schedule to the deed power houses, bungalows, machinery, cables, unadjusted profits, as provided in such deed, and the undertaking and other property and assets of the Bhatpara Power Co., Ltd. (being property acquired by the company as from January 1st, 1934). Registered pursuant to Section 81 of the Companies Act, 1929. Trustees: T. Lamb, c/o Begg, Dunlop & Co., Ltd., 1 and 2, Hare Street, Calcutta; and H. P. Sutcliffe, c/o Sandersons & Morgans, 26, Dalhousie Square, Calcutta.

Braintree Broadcast Relay Service, Ltd.—The nominal capital has been increased by the addition of £2,000 beyond the registered capital of £3,750. The additional capital is divided into 2,000 non-redeemable preference shares of £1 each, ranking *pari passu* with the existing cumulative preference shares. (On the same date the rights of the existing preference shares were varied, and they are now entitled to a cumulative preferential dividend of 8 per cent., but no further participation in profits or surplus assets, nor to any votes unless their dividends are twelve months in arrear.)

West Wilts Electric Light & Power Co., Ltd.—Capital, £250,000 in 10,000 preference shares of £5 and 200,000 ordinary shares of £1. Return dated May 1st (filed June 14th), 1934. 5,306 preference and 200,000 ordinary shares taken up. £226,530 paid. Mortgages and charges nil.

Wantage Electric Supply Co., Ltd.—Capital, £6,000 in 600 preference shares of £5 and 3,000 ordinary shares of £1. Return dated May 1st, 1934. 240 preference and 2,202 ordinary shares taken up. £3,402 paid on these shares. Mortgages and charges nil.

New System Private Telephones, Ltd.—Capital, £20,000 in £1 shares. Return dated May 21st, 1934. All shares taken up. £33,000 paid (including £15,000 premium paid on 5,000 shares). £2,000 considered as paid. Mortgages and charges nil.

Contraflo Engineering Co., Ltd.—Capital, £43,725 in 53,000 shares of 16s. 6d. each. Return dated May 3rd, 1934. All shares taken up. £43,725 considered as paid. Mortgages and charges nil.

I.T.C., Ltd.—Capital, £20,000 in £1 shares. Return dated May 21st (filed July 3rd), 1934. 15,000 shares taken up. £15,000 paid. Mortgages and charges nil.

Cunningham Beard & Co., Ltd.—Wm. Nicholson, 12, Wood Street, E.C.2, ceased to act as receiver and/or manager on August 23rd, 1934.

J. L. Hills Manufacturing Co., Ltd.—C. R. Odell, 62, Kenneth Road, Chadwell Heath, Essex, ceased to act as receiver and/or manager on August 23rd, 1934.

Sign Construction Co., Ltd.—Agreement dated August 20th, 1934, to secure all moneys from time to time advanced under the terms of the agreement. Property charged: Benefit of all contracts now or at any future time entered into by the company for the construction, installation, sale, maintenance, repair, letting or hiring out of electrical or other signs in those cases in which advances have been made by S. C. Finance Corporation, Ltd. Holders: S.C. Finance Corporation, Ltd., 25, Shaftesbury Avenue, W.1.

Yorkshire (Woollen District) Electric Tramways, Ltd.—Capital, £500,000 in 250,000 preference and 250,000 ordinary shares of £1. Return dated June 7th, 1934. 220,000 ordinary shares taken up. £220,000 paid. Mortgages and charges, nil.

South Somerset and District Electricity Co., Ltd.—Capital, £20,000 in £1 shares. Return dated June 1st, 1934. All shares taken up. £20,000 paid. Mortgages and charges, nil.

Delhi Electric Supply and Traction Co., Ltd.—Capital, £200,000 in £1 shares. Return dated June 12th, 1934. All shares taken up. £121,000 paid. £79,000 considered as paid. Mortgages and charges, nil.

East Suffolk Electricity Distribution Co., Ltd.—Capital, £50,000 in £1 shares. Return dated June 1st, 1934. 38,000 shares taken up. £38,000 paid. Mortgages and charges, £18,550.

Ceag, Ltd.—Capital, £1,000 in £1 shares. Return dated June 13th, 1934. All shares taken up. £1,000 paid. Mortgages and charges, nil.

John Davis & Son (Derby), Ltd.—Capital, £35,000 in 20,000 ordinary and 15,000 unclassified shares of £1. Return dated June 6th, 1934. 15,000 ordinary shares taken up. £15,000 paid. Mortgages and charges, nil.

Leslie Fink, Ltd.—Mortgage on land and 2, Manley Road, Withington, Manchester, thereon, dated August 24th, 1934, to secure £300 and further advances. Holders: Halifax Building Society.

Nulite Fittings, Ltd.—The nominal capital has been increased by the addition of £4,000 in £1 ordinary shares beyond the registered capital of £1,000.

Duraflex, Ltd.—Eric Portlock, 8, Staple Inn, W.C.1, was appointed receiver and manager on August 22nd, 1934, under powers contained in debentures dated July 27th and July 31st, 1934.

Bowyer-Lowe & A.E.D., Ltd.—Deed of indemnity, dated August 14th, 1934, to secure all moneys not exceeding £60C, which the chargees may be called upon to pay to the Midland Bank, Ltd., under their guarantee. Property charged: All the plant and machinery of the company. Holders: C. L. Clayton, 10, Prince Albert Street, Brighton, and others.

United Ebonite Manufacturers, Ltd.—G. H. Robinson, Bassishaw House, Basinghall Street, E.C.2, ceased to act as receiver and manager on August 18th, 1934.

City Notes

J. & F. Stone Lighting & Radio, Ltd.—Presiding at the first annual meeting held on September 4th, Mr. J. Stone (chairman) said that the profits for the half-year amounted to £8,003. Since the formation of the company a further eleven shops had been acquired and these would be opened before the end of the current month. By the time the winter season started they would have forty-seven shops. The volume of sales in the radio business was larger to-day than at any previous time in his experience for this season of the year, while their lighting department was also holding its own.

Blue neon tubing is used to good effect on the exterior of the News Theatre, Waterloo Station, opened last week

The Brazilian Traction, Light & Power Co. has announced a quarterly dividend of 1½ per cent. on the cumulative preference shares.

The South Metropolitan Electric Light & Power Co., Ltd., has announced an interim ordinary dividend of 3 per cent., less tax (same).

The Globe Telegraph & Trust Co., Ltd., is paying a quarterly dividend of 1s. per share net on the ordinary shares (unchanged).

Stocks and Shares

TUESDAY EVENING.

THE price of gold, more than any other financial factor, focuses attention at the present moment. The air is full of talk of devaluation of various currencies, and all men are wondering to what giddier height the price of gold is likely to soar. Meanwhile, industrial conditions in the United States have been thrown into renewed disorder by a strike on the grand scale, and on the Continent the result of the recent German plebiscite has done nothing to increase confidence in German or other Continental securities. Australia is to have a general election at the end of next week. The party at present in power has done so much, in so short a time, to restore what was the waning credit of Australia that the result of the Commonwealth election is held in very little doubt. In the face of these conditions abroad, it is not surprising to find that investment money continues to seek the safety of British stocks and shares for its use.

Gilt-edged Strength

Prices of all the gilt-edged stocks and shares, including amongst the latter the ordinary shares of the home electricity supply companies, hold their ground with a strength which confounds the pessimism of those who profess to look for a reaction in the best-class securities. It will not have escaped notice that almost every week reference is made here either to the strength of such stocks or to rises which illustrate it. This week, for instance, London and Home Counties 4½ per cents. are up 2 points to 110. Further advances have occurred in the London Passenger Transport prior-charge securities. The " C " stock remains at 80.

Debenture and Preference Gains

During the last day or two a number of rises have taken place in the debenture stocks of leading electricity supply companies. Amongst other improvements, mention may be made of the 4 per cent. debenture stock of the Charing Cross Company, which has moved up to 102, the 4½ per cent. debenture rising to 102½. City of London fives at 124½, Edmundson fours at 105½, Metropolitan 4½ per cents. at 109, are all higher than they were a week ago. In this connection the proprietors of such securities may be invited to examine the precise terms of the issues, in order to ascertain whether there is a chance of the stock being repaid at 100 within some comparatively early date. In certain cases the companies have the right to draw, or to pay off debenture stocks at 100, and this is a consideration which should not be overlooked. Prices of electricity supply preference shares, in most cases

irredeemable, are following the same upward course. British Thomson-Houston 7 per cent. preference at 28s. 6d., Yorkshire sixes at 31s. 6d., Electric Supply preference and South Metropolitan preference at 30s. 6d. and 29s. 6d. respectively are all higher on the week.

Lucky Underwriters

It will be remembered that about a month ago the holders of the North Wales Electric Power T. F. A. 4½ per cent. guaranteed debenture stock were given the option of being repaid in cash or of accepting a new 3 per cent. issue at 100. The subscription lists remained open for several weeks, in order to give proprietors of the debenture stock the opportunity to subscribe. Dealings in the new scrip started on Tuesday in this week. Underwriters found that they were left with 67 per cent. of the issue. As usual in such circumstances the price began at a discount. Several large amounts of stock changed hands on the basis of ⅜ under the issue price of 100. Then some bright intelligence observed that, in comparison with Conversion three per cents.—a British Government issue—the newly offered North Wales Power Threes looked cheap. Buyers came into the market, and the price was quickly put up to ½ premium, the rise being so rapid that some, at any rate, of the underwriters found themselves compelled to accept a bigger price than they would have been quite ready to take when the market opened.

Metropolitan Assented

Mention was made last week of the public interest that is being taken in the date of interest payment on Metropolitan Railway assented stock. September 21st was estimated here as the approximate date upon which holders of the stock might expect to receive their dividend. The official confirmation was forthcoming on Monday in this week. Warrants for the distribution at the full rate of 3¼ per cent., in respect of the year ended June 30th last, are to be posted on that date. Veiled excuse for the delay in payment is made by the official reminder that the interest on the Metropolitan assented stock depends upon that declared on London Passenger Transport "C." This is correct, no doubt, in one respect. But the investor will retort that he holds as a greater measure of security the guarantee of the various companies which stand at the back of this assented stock, and that it is of no particular consequence to him when the dividend on Transport "C" is distributed. The price of the assented stock is about 78.

Cables and Wireless

Cables & Wireless stocks are beginning to return into public favour. Once more a general rise in prices on the week has taken place. It is still possible to buy £100 of each class of stock for £100 money, but the outlook seems a little less doleful than it was, and people are picking up the stocks. Some have noticed the discrepancy between the price of Cables preference and Globe Telegraph & Trust ordinary, to which attention was directed here on August 24th (ELEC. REV., page 263), Globe ordinary shares being at that time, it was stated, demonstrably cheaper than Cables preference. Both issues have improved since then, but the 10s. rise in Globe Telegraph is greater in proportion than the 2½ points in Cables preference.

A Mexican Slump

Two or three weeks ago it began to look as if matters in Mexico were shaping towards a better state of affairs, but, on top of this, there came a circular, a few days ago, from the Mexican Light & Power Company saying that the Mexican Government insists upon an arbitrary lowering of the tariffs to a level very much below even the reduced rates proposed by the company. A Rate Commission was appointed in Mexico two and a half years back, and this belated action is the result. As a consequence, Mexican Light & Power 5 per cent. bonds have fallen 10½ to a nominal 35. Mexico Tramways fives are 2 points lower. Other Mexican utility bonds have suffered to a greater or a less degree.

Equipment and Manufacturing Shares

The market for shares in manufacturing and equipment companies is showing decided strength. Investment asks every day what shares are worth buying, in view of the expansion of interest in electrical matters of all kinds. Obviously the public are impressed with the outlook for manufacturing companies, the shares in the best of which are now difficult to obtain. British Insulated are 1s. 9d. up, and Callenders ⅛. Arons jumped to £3. Associated Electrical Industries ordinary are half-a-crown higher at 21s. 6d., there being talk of a restoration of the dividend to the previously paid 4 per cent. Last year the dividend was 3 per cent. Dividend talk is responsible also for activity in Johnson & Phillips shares. A moderate line came to market the other day, depressing the price to 22s. 6d. The shares were promptly taken, and the price has recovered to 24s. 6d. Rumour has it that the company may declare an interim dividend, and that for the full year the previously paid 5 per cent. is likely to be increased. Possibly these are early days in which to forecast such improvements, but it is upon the strength of expectations of this nature that the prices are advancing. Crompton Parkinson "A" shares at 27s. show a gain of 1s. 6d., the ordinary shares remaining at 25s. 6d. Among lower-priced shares, Electric Constructions at 11s. 3d. are ⅛ up.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. Sept. 4.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6xd	—	3 17 2
Brompton Ordinary	1	7	7	34/–	—	4 2 4
Charing Cross Ordinary	1	7	7	34/6	—	4 1 2
Chelsea	1	7	7	34/–	—	4 2 4
City of London	1	7½	7½	36/3	—	4 2 9
Clyde Valley	1	7	7	38/9xd	—	3 12 2
County of London	1	10½	10½	57/6	—	3 13 1
Edmundson's 7% Pref.	1	7	7	34/6	—	4 1 2
Elec. Dis. Yorkshire	1	9	9	47/6	—	3 15 9
Elec. Supply Corporation	1	11	11	60/9	—	3 12 4
Kensington Ordinary	1	7	7	34/–	—	4 2 4
Lancs Light and Power	1	7	7½	37/6	—	4 0 0
London Electric	1	7	7	34/–	—	4 2 4
Metropolitan	1	10	10	53/9	—	3 14 6
Midland Counties	1	7	7	37/6	—	3 14 8
Mid. Elec. Power	1	8	8	43/9	—	3 13 2
North Eastern Electric Ordinary	1	6	6	33/–	—	3 12 10
Do. 7% Pref.	1	7	7	35/–	—	4 0 0
Northampton	1	10	10	53/–	—	3 15 4
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 4
North Met. Elec. Ordinary	1	10	10	3½	+⅛	3 4 0
Do. do. 6% Pref.	1	6	6	31/6	+6d.	3 16 2
St. James' and Pall Mall	1	7	7½	36/–	—	4 3 4
Scottish Power	1	8	8	40/–	—	4 0 0
South London	1	7	7	36/–	—	3 17 9
Westminster Ordinary	1	7	7	34/–xd	—	4 2 4
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/–	—	7 2 10
Yorkshire Elec.	1	8	8	46/3	—	3 9 1

PUBLIC BOARDS.

Central Electricity, 1950–70	Stock	5	5	115	—	4 7 0
Do. 1955–75	,,	5	5	116xd	—	4 4 9
Do. 1951–73	,,	4½	4½	110	+1	4 1 10
Do. 1963–93	,,	—	3½	101	—	3 9 4
London & Home Counties, 1955–75	,,	4½	4½	110	+2	4 1 10
London Passenger Transport, A...	,,	—	4½	121	+1	3 14 5
Do. do. B...	,,	—	5	125	+1	4 0 0
Do. do. C...	,,	—	3	80	—	3 15 0
West Midlands Joint Elec. 1948–68	,,	—	5	113xd	+1	4 8 6

TELEGRAPH AND TELEPHONES.

American Tel. & Tel.	$100	9	9	110½	−2	8 2 10
Anglo-Am. Tel. Pref.	Stock	6	6	112	—	5 7 2
Do. Def.	,,	1½	1½	27	—	5 11 1
Cables & Wireless 5½% Pref.	,,	2¾	2¾	72½	+1	3 15 10
Do. A. 7½% Ord.	,,	Nil	Nil	15½	+1	—
Do. B. Ord.	,,	Nil	Nil	7⅛	+⅛	—
Globe Tel. and T. Ord.	10	Nil	2½	9½	+½	2 14 1
Do. do. Pref.	10	6	6	12½	+¼	4 16 0
Great Northern Tel.	10	20	20	36½	+½	5 9 7
Marconi-Marine	1	10	7½	31/3	—	4 16 0
Oriental Telephone Ord.	1	12	12	3⅛	—	*3 15 3

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5½	—	—
British Electric Traction Df. Ord.	,,	5	5	685	−15	—
Do. do. Pref. Ord.	,,	8	8	160½	—	4 19 8
Brazil Traction	100	—	—	10⅝	−⅛	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	105	—	4 15 3
Mexico Trams, 5% Bonds	—	5	5	20½	−2	—
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	—	5	5	35	−10½	—
Victoria Falls Ord.	1	15	20	6 7/16	—	3 2 0
Yorkshire (West Riding)	1	2½	5	25/–	−9d.	4 0 0

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	10	3	+⅛	3 6 8
Assoc. Elec. Ord.	1	4	3	21/6	+½	2 15 10
Do. Prf.	1	8	8	32/–	—	5 0 0
Babcock & Wilcox	1	9	6	44/–	—	2 14 7
British Aluminium Ord.	1	5	5	28/3	—	3 11 0
British Insulated Ord.	1	15	15	73/–	+1/9	4 2 3
Brush Ord.	Stock	Nil	Nil	33	—	—
Callender's	1	15	15	3½	+⅛	4 12 4
Do. 6½% Prcf.	1	6½	6½	31/3	—	4 3 2
Crompton Parkinson Ord.	5/–	22½	12½	25/6	—	4 18 4
Do. 8% Pref.	1	8	8	33/9	—	4 14 10
Edison-Swan 1st Pref.	1	7½	7½	21/3	—	7 1 2
Do. 5% Deb.	Stock	5	5	107½	—	4 13 0
Electric Construction	1	Nil	Nil	11/3	+⅛	—
Enfield Cable Ord.	1	25	20	85/–	—	4 14 1
English Electric	1	Nil	Nil	5/9	—	—
Do. do. Pref.	1	Nil	Nil	10/–	+6d.	—
Ever Ready	5/–	35	35	28/–	−6d.	6 5 0
Ferranti Pref.	1	7	7	26/6	—	5 5 8
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	8	8	46/3	+6d.	3 9 3
Henley's	1	30	30	6½	—	4 17 8
Do. 4½% Pref.	5	4½	4½	5½	—	4 1 9
India-Rubber Preferred	1	—	—	18/9	—	—
Johnson & Phillips	1	5	5	24/6	+⅛	4 1 8
Siemens Ord.	1	6½	4	17/6	—	4 11 5
Telegraph Construction	£1	Nil	Nil	1	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1932

31670. "Electric cables." Pirelli-General Cable Works, Ltd., and J. L. Bishop. November 9th, 1932. (414713.)

1933

186. "Control of vapour arc convertors." General Electric Co., Ltd., and E. Gallizia. January 3rd, 1933. (414715.)

250. "Electric muffle furnaces." O. Junker Ges. January 4th, 1932. (414643.)

991. "Control of electric discharge vessels." Siemens-Schuckertwerke Akt.-Ges. January 20th, 1932. (414746.)

2787. "Electrical relay systems." C. A. Parsons & Co., Ltd. J. Rosen, L. D. Morphew and C. Giles. January 28th, 1933. (414647.)

3387. "Arrangements for converting direct current electric supply into alternating current electric supply." W. Dallenbach. February 10th, 1932. (414650.)

3392. "Thermionic amplifiers." Electric & Musical Industries, Ltd., and H. L. Oura. February 3rd, 1933. (414651.)

3744. "Electric motors." General Electric Co., Ltd. and H. C. E. Jacoby. February 7th, 1933. (414701.)

3854. "Photographic sound-recording apparatus." Siemens & Halske Akt.-Ges. February 16th, 1932. (414680.)

3868. "Directional lighting fittings." General Electric Co., Ltd., and E. L. B. Damant. February 8th, 1933. (414726.)

3869. "Electric transformers." General Electric Co., Ltd., and G. C. Marris. February 8th, 1933. (414727.)

3975. "Inductances." General Electric Co., Ltd., H. C. Turner and G. R. Polgreen. February 9th, 1933. (414707.)

4022. "Vacuum electric discharge tubes." C. R. Burch, J. H. Ludlow and Associated Electrical Industries, Ltd. February 9th, 1933. (414753.)

4052. "Television." Electric & Musical Industries, Ltd., and C. O. Browne. February 9th, 1933. (414730.)

4077. "Device for regulating the voltage in alternating-current lines." Westinghouse-Cooper-Hewitt Ges. February 16th, 1932. (Cognate applications 4078/33 and 4079/33.) (414754.)

4152. "Lighting fittings." General Electric Co., Ltd., and J. G. Christopher. February 10th, 1933. (414733.)

4359. "Mechanical frequency standards such as piezo-electric crystals." Standard Telephones & Cables, Ltd. (M. C. Tounier). February 13th, 1933. (414764.)

4360. "Manufacture of electric cables." Standard Telephones & Cables, Ltd. W. K. Weston and L. E. Currah. February 13th, 1933. (414765.)

4754. "Synchronous alternating-current motors." F. Hope-Jones. February 16th, 1933. (414777.)

5092. "Electrical control systems for controlling the thickness of strip material." British Thomson-Houston Co., Ltd. February 18th, 1932. (414785.)

5427. "Electric tumbler switches." C. L. Arnold, R. W. Dowsett and M. K. Electric, Ltd. February 22nd, 1933. (414791.)

7311. "Tension clamps for supporting electric conductors." Electrical Improvements, Ltd. and J. R. Kennedy. March 10th, 1933. (414808.)

7858. "Trolley mounting for tramway-cars and like vehicles." Metropolitan-Cammell Carriage Wagon & Finance Co., Ltd., and F. H. Rayer. March 15th, 1933. (414811.)

8955. "Means for mounting electrical apparatus." General Electric Co., Ltd., and R. Gosden. March 24th, 1933. (414819.)

9722. "Electric battery lamps for fishing and other marine buoys." H. A. Johannesen. March 31st, 1933. (414822.)

9766. "Electric accumulator." K. Griebel. March 31st, 1933. (414824.)

9788. "Electric hand lamps." E. S. Conradi. March 31st, 1933. (Addition to 360370.) (414826.)

10433. "Lift-out electric fuse isolators." General Electric Co., Ltd., W. H. Sullock and A. F. Searle. April 7th, 1933. (414833.)

12526. "Electric welding apparatus." British Thomson-Houston Co., Ltd. April 30th, 1932. (414849.)

12543. "Devices for collecting electric currents from overhead conductors for transmission to moving vehicles." F. Whyman and Associated Electrical Industries, Ltd. April 29th, 1933. (414850.)

12769. "Electric generators." L. L. De Kramolin. May 3rd, 1932. (414851.)

13214. "Electrical accumulators and batteries." T. A. Hodgkiss and W. E. Smith. May 6th, 1933. (414853.)

13768. "Device for use in conjunction with telephones for notifying to the caller the time of the return of the subscriber who is absent when called." H. Hobohm. May 11th, 1933. (Convention date not granted.) (414858.)

14173. "Electric advertising lamps." H. Hartman. May 16th, 1933. (414863.)

16032. "Device for operating discharge tubes having incandescent cathodes." C. H. F. Muller Akt.-Ges. June 16th, 1932. (414874.)

17179. "Electrical apparatus for anæthetising dogs, cats, and the like." C. R. Golledge. June 16th, 1933. (414880.)

18407. "Electric clocks." Gent and Co., Ltd., and R. Swift. June 28th, 1933. (Addition to 385457.) (414884.)

19069. "Circuit arrangements for automatically limiting the duration of an electrical process." C. H. F. Muller Akt.-Ges. July 15th, 1932. (Cognate applications, 19070/33 and 19071/33.) (414889.)

19747. "Insulator bushings for the electrodes in electric, gas or vapour discharge devices." Allmänna Svenska Elektriska Aktiebolaget. July 13th, 1932. (414892.)

20035. "Method and apparatus for producing or regulating a state in a fluid by electrical treatment thereof, more particularly in air for ventilation." C. P. Yaglou. November 8th, 1932. (Divided application on 23804/31.) (414687.)

23983. "Telephone systems." Telefonaktiebolaget L. M. Ericsson. August 29th, 1932. (414904.)

24069. "Luminescent materials and methods of manufacturing the same." Marconi's Wireless Telegraph Co., Ltd. August 30th, 1932. (414905.)

24704. "Ribbon microphones." Dr. O. K. Kolb. September 6th, 1933. (414907.)

26124. "Thermostatic control arrangements." Telefunken Ges. für Drahtlose Telegraphie. September 21st, 1932. (414912.)

26335. "Down leads for wireless aerials." Ward and Goldstone, Ltd., and A. W. Webb. September 25th, 1933. (414913.)

28223. "Electric skill-testing apparatus." O. Fehre. October 12th, 1932. (414921.)

29743. "Electron-discharge amplifiers." British Thomson-Houston Co., Ltd. October 26th, 1932. (414927.)

32216. "Shutter devices for wireless tuning dials." Ideal Werke Akt.-Ges für Drahtlose Telephonie. November 24th, 1932. (414937.)

1934

156. "Electric hand boring machines with cooling arrangements." Siemens-Schuckertwerke Akt.-Ges. May 9th, 1933. (414961.)

812. "Electric distance relay." Allmänna Svenska Elektriska Aktiebolaget. January 10th, 1933. (414963.)

1455. "Permanent magnets." Siemens & Halske Akt.-Ges. January 13th, 1933. (414967.)

8763. "Electric motors." F. Loeffler. January 30th, 1933. (Divided application on 2862/33.) (414688.)

9160. "Trolley-heads for tramcars and the like." A. R. Suffling, J. G. Drysdale and S. D. Hammond. March 23rd. 1934 (414996.)

9411. "Temperature compensation in electrical meter devices with cuprous oxide rectifier." Hartmann & Braun Akt.-Ges. July 24th, 1933. (414997.)

11572. "Electric blasting fuses." K. Schaffler-Glossl. February 4th, 1933. (Divided application on 3477/33.) (414670.)

16023. "High-frequency amplifying arrangements." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 26th, 1933. (Divided application on 35099/33.) (415009.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 29th :—

Verticable. No. 551755. Class 8. Electric cables.—Pirelli-General Cable Works, Ltd., 343-345, Euston Road, London, N.W.1.

Dielkometer. No. 552920. Class 8. Measuring instruments and apparatus.—Haardt & Co. Gesellschaft, Dusseldorf, Germany. (British representatives: Sefton-Jones, Odell & Stephens, 285, High Holborn, London, W.C.1.).

Telerazor. No. 552796. Class 8. Electrically operated razors. —Norma Technical Products, Ltd., 119-125, Finsbury Pavement, London, E.C.2.

G.E.C. No. 552830. Class 13. Electrical fittings of metal.—General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

Efficiency of Storage-type Water Heaters

INVESTIGATIONS by Voigt at the Technische Hochschule, Darmstadt, demonstrate the importance of making tests under the same conditions if strictly comparable data are to be obtained concerning the performance of different types of water heaters. The overall economy often depends more on the loading and method of use than on the actual construction of the apparatus. In particular, a consistently incomplete utilisation of the full capacity of a heater results in a substantial reduction in overall efficiency, apart from the question of the needlessly heavy capital expenditure incurred. Tests on three low-pressure displacement-type storages of 6.6, 11.0 and 17.6 gallons capacity, rated at 400, 650 and 900 W respectively, gave the following percentage values for the heating-up efficiency: 6.6 gal. size, 83; 11 gal. size, 85.5 to 87.5; 17.6 gal. size, 86 to 89. The cooling constants, *i.e.*, the temperature drop of the water per deg. C. difference of temperature between water and atmosphere, were about 0.022, 0.016 and 0.013 deg. C. in the respective cases. All of these data show the higher efficiency of the larger storages under the same conditions.

In order to ascertain the influence of the extent of utilisation, the three storages were fully charged during the night and then, commencing at 7 a.m., water was run off at intervals of one or two hours on an ordinary domestic bath and kitchen schedule until at 8.30 p.m. the storage was fully or half discharged. At full utilisation the overall percentage efficiencies of the storages ranged from 78 to 82 when worked on the displacement principle and 67 to 73 on the run-off principle; while at half-utilisation the corresponding figures were 59 to 64 and 47 to 57 respectively. The higher figures in each case refer to the larger storages, and the conclusion is that for best results a storage of 10 to 15 gal. or greater capacity should be used, provided that all or nearly all the stored water can be employed usefully between the completion of one charging period and the commencement of the next. The reduction in overall efficiency resulting from the use of much too large a storage, *e.g.*, one which is only half discharged before re-charging commences, is, however, much greater than the differences in efficiency of fully utilised heaters of different sizes and types. In the cases investigated, full utilisation of the smallest and least efficient heater gives appreciably higher economy than half utilisation of the largest and most efficient apparatus. At full utilisation the electric storage heater shows a higher overall thermal efficiency than a gas-heated storage, but this advantage may be sacrificed if the electric storage be utilised much below 75 per cent. of its daily capacity.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Block at Royal Infirmary (£60,000); Medical Superintendent.

Arnold.—Fire and ambulance station, public conveniences, and two cottages at Daybrook; Surveyor to the council, Public Offices, Arnot Hill.

Ashton-under-Lyne.—Houses (58), Hurst Bank estate (electrical work); Wrathmell and Blackshawk, architects, Queen's Buildings, Stockport.

Barrow-in-Furness.—Church of St. John on Barrow Island for Parochial Council (electrical work); Seely & Paget, architects, 41, Clothfair, London, E.C.1.

Barwell.—School; Leicestershire county architect.

Belfast.—Nurses' Home for the Royal Victoria Hospital; Young & McKenzie, architects, 143, Scottish Provident Buildings.

Billingham.—School clinic and welfare centre, Bedale Avenue; Durham county architect.

Birkenhead.—Office building and assembly hall, Glebeland Road, for Transport and General Workers' Union (electrical work); T. W. Bradshaw, builders, Poulton Road, Wallasey.

Birstall.—Primary school; Leicestershire county architect.

Bishop Auckland.—Additions to the Girls County School for the E.C.; F. Willey, architect, 34, Old Elvet, Durham.

Bolton.—Erection of new offices, for I. Pearson, Ltd., Gladstone Street Mills (electrical work); W. Gornall & Sons, builders, Ellesmere Street. Market hall (£15,000); borough engineer.

Bosworth Park.—Nurses' home, Mental Institution; Leicestershire county architect.

Bromsgrove.—Extensions to Hilltop Hospital (£11,000), for Bromsgrove, Droitwich, and Redditch Isolation Hospital Committee; clerk.

Brownhills.—Houses (82), for the U.D.C.; N. Waine, clerk to the council, Council offices.

Callington (CORNWALL).—Factory, for the Tamar Valley Canning Co.; W. Verran, 2, George Place.

Chelmsford.—Shops, London Road; A. J. Arnold, builder. Flats and shops, Moulsham Street, for J. W. Dorward.

Cheltenham.—Covered market; Gloucestershire Marketing Society. Houses (132), Tewkesbury Road; borough engineer.

Chester-le-Street.—Extensions to the Isolation Hospital (£7,294); W. Norman, builder, 3, West Lane.

Chichester.—Public offices for the R.D.C.; West Sussex General Builders.

Darlington.—Regal Cinema in High Street; R. G. Tarran, Ltd., builders, Ryde Avenue, Hull.

Darwen.—Semi-detached houses (49), George Street and Woodside Mills, for Dingle Estates (Manchester), Ltd., builders, Windmill Lane, Denton (electrical work).

Dublin.—Flat dwellings (76), at Hanover Street; H. G. Simms, housing architect, 3, Parliament Street.

Dunfermline.—Maternity home and hospital for T.C.; burgh surveyor.

Durham.—Schools at Stanhope and Seaham Harbour for the County E.C.; T. B. Tilley, director of education, Durham.

Eastbourne.—Reconstruction of Sussex Hotel, Cornfield Terrace; Bass, Radcliffe & Gretton. Church and vicarage, Victoria Drive; P. D. Stonham & Son, architects, &c., Watson Trust. Houses (247), Hydeye Estate, Hampden Park; Oliver & Leeson, architects. Dairy, Susans Road; Home Counties Dairies, Ltd.

East Grinstead.—Hospital (£22,000), for Queen Victoria Memorial Cottage Hospital Committee; secretary.

Glasgow.—Shops and houses in Carntyne Road, for Corporation; City architect. Estate development, Lothian Drive, Clarkston; J. Allen, builder. Church in Carntyne Road for R.C. Archdiocese of Glasgow; Rev. T. McEwan, St. Thomas R.C. Church, Smithycroft Road.

Hamilton.—Houses (52) and shops (£25,000), and hostel (£2,500), for T.C.; W. H. Purdie, burgh surveyor, Municipal Offices.

Haweswater.—Hotel (£15,000), for Manchester T.C.; W. Ellerton, architect, Manchester.

Hetton (Co. DURHAM).—Houses (50), Easington Lane, for the U.D.C.; A. H. Fennell, architect, Chester-le-Street.

High Wycombe.—Housing scheme, Southfield Road, for A. W. Cousens, 27, Coningsby Road; R. G. Brocklehurst, architect.

Hinckley.—Reconstruction of Borough Cinema; Cinema Co.

Hoddesdon.—Public offices (£10,000); W. Plumpton, U.D.C. surveyor.

Honiton.—Houses (40), for Corporation Housing Committee; borough surveyor.

Hyde.—Alterations to Highland Laddie Hotel, Grafton Street; Wilson's Brewery Co.

Ilford.—School, Newbury Park, for the Borough E.C.; L. E. J. Reynolds, education architect, Town Hall.

Kingston-on-Thames.—Extensions to Victoria Hospital (electrical and heating work, £7,700); W. H. Gaze & Sons, Ltd., builders.

Kirkham.—Houses (77), for U.D.C. (electrical work); F. Howarth, architect, 10, Theatre Street, Preston.

Leicester.—County offices; Leicestershire county architect. County library, New Street (£2,293); H. Herbert & Sons. Improvements at Poor Law Institutions (£4,735); W. Keay, architect.

Lincoln.—Houses (50), Simon's Hill, Boultham; borough surveyor, Silver Street.

Liverpool.—Shops, houses, garage, petrol station and lock-up garages, Queens Drive, West Derby (electrical work); S. H. Kelly, 24, Albany. Houses (400), Broadgreen Road, Broadgreen (electrical work); W. Roberts & Co., Idanfryn, Dunbabin Road, Wavertree. Tenement dwellings (180) and shops, Myrtle Street site; Director of Housing, Dale Street.

London.—HERNE HILL.—Baths, Dulwich Road (£12,500); borough engineer, Lambeth. (KENNINGTON).—Memorial creche (£5,526); W. Downs, Ltd., builders.

Loughborough.—Office block on Derby Road for Genatosan, Ltd. (electrical work); T. Barker & Sons, builders, Swan Street. Gymnasium, Grammar School (£2,000); Endowed school governors.

Macclesfield.—Alterations to St. Paul's Schools for the School Managers (electrical work); A. E. Powles, architect, 7, Winnington Street, Northwich. Development of Sutton Hall Estate for F. Fryer & Co., builders, Bramhall (electrical work); H. McLellan, architect, 72, Woodsmoor Lane, Stockport.

Maidstone.—Municipal aerodrome, Langley; Town Clerk.

Manchester.—Offices, Ancoats, for L. Lighthill & Co., Fawcett Street (electrical work); A. Cassell & Sons, builders, 300, Great Cheetham Street, Broughton. Warehouse, Shude Hill, for Marsden Harcombe & Co., Cross Keys Street (electrical work); Thomas & Jones, Ltd., builders, Moor Street, Rusholme. Medical library, refectory, assembly hall, swimming pool and courts for Council of Manchester University (electrical work); T. Worthington & Sons, architects, 178, Oxford Road. Houses, Lower Crumpsall (141) and Moston (168); city architect.

Market Bosworth.—Council offices for R.D.C.; G. Smith, architect, Desford, Leics.

Market Harborough.—Casual wards; Leicestershire county architect.

Middlesbrough.—Additions to the Newport Hotel; W. Pearson & Son, builders, Burn Road, West Hartlepool.

Nantwich.—Houses (42) for the U.D.C.; Fletcher & Sons, builders, Crewe.

Narborough.—Hospital wing and mental colony; Leicestershire and Rutland Mental Hospital Board.

Newcastle-on-Tyne.—Workshops, offices and showrooms, Prudhoe Street, for W. and T. Avery, Ltd. Showrooms, Eldon Lane; Mauchlen and Weightman, architects, Collingwood Street. Stores for Eastern Electrical Supply Co., Ltd.; Trust Concrete Co., London. Works and offices for Rington, Ltd.; W. Hall, Derwentwater Road, Gateshead.

Norham (NORTHUMBERLAND).—Houses (148) for the U.D.C.

Northampton.—Houses (50), St. David's Estate, Kingsthorpe; W. R. Kew, town clerk, Guildhall.

North Riding.—Infirmary at Guisborough for the C.C.; J. R. White, county architect, Northallerton.

Oldham.—Extensions to Public Assistance Offices for the T.C. (electrical work); J. Hartley, builders, Cobden Street, Chadderton.

Oxford.—Houses (52); Hinkins & Frewin, Ltd. Warehouse, &c., Ferry Hinksey Lane; Oxford Co-operative Society, Ltd.

Padiham.—Town Hall; U.D.C. surveyor.

Peterhead.—Hospital for T.C. (£5,000); J. Dickie, burgh surveyor, Arbuthnot House.

Preston.—Pavilion, offices, training quarters, &c., for Preston North End F.C., Ltd. (electrical work); J. Dillon & Sons, builders, 14, Heatley Street.

Radcliffe.—Re-erection of Irwell Chemical Works for Pinnington, Dawson & Ward, Ltd.

Reading.—Practical instruction centre, Harley Road schools. Caversham, for the Borough E.C.; W. R. Morris, architect, 1 and 2, Market Place.

Salford.—Houses (400) and shops, Lancaster Road, Pendleton; I. Hill & Son, Ltd., builders, Pendleton.

Sheffield.—Cinema, Stubbin Estate; Paragon Picture House (Sheffield), Ltd.

Sherwood.—Swimming bath; Corporation Baths Committee.

South Charnwood.—School (£16,825); Orton & Co., Coalville.

Southport.—Development of Old Market site with four-storey building, comprising shops and offices, for the T.C.; Town Clerk.

South Shields.—Rebuilding of Empire; E. M. Lawson, architect, 19, Ridley Place, Newcastle.

Stockport.—Offices for Halifax Building Society (electrical work); R. Carlyle & Co., builders, Elsinore Road, Old Trafford, Manchester.

Stretford.—Elementary schools at Barton Road, Lostock and Cromwell Road, for E.C. (electrical work); P. Howard, architect, 88, Mosley Street, Manchester.

Stroud (GLOS).—Cinema for the Gaumont British Picture Corporation, Ltd., 6, Denman Street, London, W.

Sunderland.—Factory, Pallion Road; W. and T. R. Milburn, architects, 17, Fawcett Street. Extensions to the Borough Mental Hospital (£171,000); T. P. Collinge, borough engineer. Houses (71); A. Suttel, architect, 2, Victoria Avenue, Harrogate.

Sutton.—Slipper baths and swimming pool, &c., Malden Road, Cheam (£42,236); U.D.C. surveyor.

Swinton.—Development of Springwood Estate, May Road, for semi-detached houses (48) (electrical work); Palatine Builders & Estates, Ltd., St. Ann's Square, Manchester.

Throckley.—Cinema, hall and shops; Walter Wilson, Ltd., Cemetery Road, Gateshead.

Wadhurst.—Schools, Mayfield Lane, for the Church of England Managers; secretary.

Warrington.—Extensions to premises for Tanner Bros., 25-29, Winwick Street (electrical work); T. F. Wallington, builders, Firth Saw Mills, Frog Hall Lane.

Westbury-on-Trym.—Hospital at Brentry Colony; Stock, Page & Stock, architects, 18, St. Thomas Street, London, S.E.1.

Whitstable.—Development of housing estate at Swalecliffe; Goodwin & Russell, Ltd., builders, West Cliff, Herne Bay.

Wigston.—Cinema, Long Street; Cinema Co.

Wirksworth.—Swimming and slipper baths; U.D.C. surveyor.

Wirral.—Development of housing estate by Wirral Development Co., 14, George Street, London.

Woodstock.—Additions to Rose and Crown Hotel, Old Woodstock; proprietors.

Youghal.—Houses (28), for U.D.C.; H. T. Spreadborough, town surveyor and engineer, Town Hall.